USER MANUAL

ATEQ F420P

Version 1.0

www.ateq.com

Reference: UM-20300F-U

REVISIONS OF THE ATEQ F420P USER MANUAL

Due to continuing improvements, the information contained in this user manual, the features and design of this device are subject to be changed without prior notice.

Edition/Revision	**Reference**	**Date** week/year	**Chapters updated**
First edition	UM-20300A-U	16/2002	-
Second edition	UM-20300B-U	13/2003	All. Up dating the manual after some corrections.
Third edition	UM-20300C-U	39/2005	Remove paragraph on time keeper in chapter 4, up dating the measurements characteristics in the preamble.
Fourth edition	UM-20300D-U	09/2006	Chapter 4, add function "Dump level" and "Input 5 configuration".
Fifth edition	UM-20300E-U	02/2008	Error correction for IN7/ IN5. Updating the relays board schemes.
Sixth edition	UM-20300F-U	48/2011	Chapter 1, correction of the outputs on the relay board scheme.

Recommendations for leak testing intruments

Precautions for the test environment

- Keep the test area as clean as possible.

Precautions for the operators

- **ATEQ** recommends that the operators using the instruments should have a suitable qualification and training with respect to the work bench requirements.

General precautions

- Read the user manual before using the instrument,
- all electrical connections to the instrument must be equipped with a safety system (fuse, circuit breaker…) appropriate to its needs and complying with the standards,
- to avoid electromagnetic interference, the cable connections to the instrument should be less than two meters in length,
- it is essential that the electrical main is earthed,
- disconnect the electrical connections to the equipment before maintenance,
- cut the air supply for any kinds of operation on the pneumatic assembly,
- do not open the instrument when it is powered up,
- avoid water spillage near of the instrument,
- **ATEQ** is at your disposal for any further information concerning the use of the instrument under maximum safety conditions.

We would like to bring to your attention that ATEQ will not be held responsible for any accident connected to the improper use of the instrument, to the work bench or to the lack of compliance with safety rules.

ATEQ, THE ASSURANCE OF A COMPETENT AFTER SALES SERVICE

■ THE ATEQ AFTER SALES SERVICE IS :

- a team of qualified technicians,
- a permanent telephone assistance,
- agencies close to you for faster reaction,
- a stock of spare parts available immediately,
- a car fleet for rapid intervention,
- a commitment to quality ...

■ THE OVERHAUL

ATEQ carries out the overhaul of your instruments at interesting prices.
The overhaul corresponds to the maintenance of the instrument (checking, cleaning, replacing of used parts) as part of preventive maintenance.
Preventive maintenance is the best way to guarantee reliability and efficiency. It allows the maintenance of a group of instruments in good operational order and prevent eventual break-downs.

■ MAINTENANCE KITS

The ATEQ After Sales Service proposes, two kits destined for the preventive maintenance of the pneumatic circuits of instruments.

■ CALIBRATION

This may be carried out on site or in our offices.
ATEQ is attached to the COFRAC and delivers a certificate following a calibration.

■ TRAINING COURSES

In the framework of partnership with our customers, ATEQ offers two types of training in order to optimise the usage and knowledge of our instruments. They are aimed at different levels of technician:

- method / control training,
- maintenance / upkeep training.

■ A TARGETED TECHNICAL DOCUMENTATION

A number of technical documents are at your disposal to allow you to intervene rapidly in the event minor breakdowns:

- problem sheets describing and offering solutions to the main pneumatic and electronic problems,
- several maintenance manuals.

■ A QUALITY GUARANTEE

The instruments are guaranteed for parts and labour in our offices:

- 2 years for leak detection equipment,
- 1 year for electrical tests to norms instruments,
- 1 year for the accessories.

Our After Sales Service is capable of rapidly answering all your needs and queries.

ATEQ recommends
to made realise by its departments
a revision and a calibration of the instruments
every year

PREFACE

Dear Customer,

You have just purchased an **ATEQ** instrument, we thank you for the trust you have placed on our brand. This instrument has been designed to ensure a long and unparalleled life expectancy, and we are convinced that it will give you complete satisfaction during many long years of operation.

In order to maximise the life expectancy and reliability of your **ATEQ** instrument, we recommend that you install this instrument on a secured workbench and advise you to consult this manual in order to familiarise yourself with the functions and capabilities of the instrument.

Our **ATEQ** After Sales Service centre can give you recommendations based on your specific operation requirements.

ATEQ

TABLE OF CONTENTS

PREAMBLE 5

1. DEFINITION OF THE ATEQ F420P 5
2. MEASUREMENT CHARACTERISTICS 6
2.1. Measurement ranges 6
2.2. Mechanical pressure regulation 6
3. THE MAIN TYPES OF MEASUREMENT 7
3.1. Direct/Pressure drop measurement 7
3.2. Indirect/Pressure rise measurement 7
4. DIRECT MEASUREMENT, PRESSURISATION 8
5. SYMBOLS PRESENTATION 9

Chapter 1 INSTALLATION OF THE INSTRUMENT

1. APPEARANCE OF THE ATEQ F420P 11
2. INSTALLATION OF THE INSTRUMENT 11
2.1. Layout of connectors on the F420P cabinet 11
2.2. Connector details 12

Chapter 2 USER INTERFACES

1. ATEQ F420P FRONT PANEL APPEARANCE 17
2. APPEARANCE OF THE KEYBOARD 18
2.1. Navigation keys 18
2.2. Cycle keys 18
3. LOCKABLE SWITCH 19
4. RAPID CONNECTORS 19
5. RÉGULATOR 19
6. 4 LINE LCD DISPLAY 20
7. FUNCTIONS OF THE INDICATOR LIGHTS 20
8. INFRA-RED INTERFACE 20

Chapter 3 START-UP AND SETTINGS

1. POWERING-UP THE ATEQ F420P 21
2. CREATION OF A TEST PROGRAM 21
2.1. Choice of the program number 22
2.2. Test type selection 22
2.3. Parameter settings 24
3. DUPLICATION OF A TEST PROGRAM 28
4. DELETING A PROGRAM OR A PROGRAM NAME 30
5. STARTING A CYCLE 31
5.1. Choice of the program to be run 31
6. STARTING A MEASUREMENT CYCLE 31
7. STOPPING A CYCLE 32
8. SETTING THE TEST PRESSURE 32
8.1. Manual setting with a mechanical regulator 32

Chapter 4 FUNCTIONS OF THE INSTRUMENT

1. MENU STRUCTURE....33
1.1. Main menu....33
1.2. "FUNCTIONS" menu when activated....36
2. CONFIGURATION MENU....38
2.1. Extended....38
2.2. RS232....47
2.3. Security....50
2.4. Lighting the screen....51
2.5. Dump level....52
2.6. I/O Configuration....53
3. SPECIAL CYCLES MENU....54
3.1. Special cycles available....54
3.2. Regulator....55
3.3. Infinite fill....56
3.4. piezzo reset....57
3.5. Manual calibration....58
3.6. ATR learning....60
4. MAINTENANCE MENU....61
5. RESULTS MENU....62
6. LANGUAGE MENU....62
7. STAND BY MENU....62

Chapter 5 ACCESSORIES

1. ACCESSORIES SUPPLIED WITH THE INSTRUMENT....63
1.1. Power supply....63
2. OPTIONAL ACCESSORIES....64
2.1. Calibrated leak....64
2.2. Needle valve and Leak/Flow Calibrator (CDF)....65
2.3. Automatic connectors with expandable joints....66
2.4. Filtration kit....66

Chapter 6 ERROR MESSAGES

ERROR MESSAGES....67

Chapter 7 OPERATIONAL PROBLEMS

1. PHENOMENON NOTED....69
1.1. Condition of the machine's seals....69
1.2. Damaged instrument seals....69
1.3. Bumper pad....69
1.4. Pneumatic air supply too low....69
1.5. Pneumatic Link....69
1.6. Environment....70
1.7. Calibration....70
1.8. Concerns about reliability of the instrument’s circuits....70

Appendices ATEQ F420P

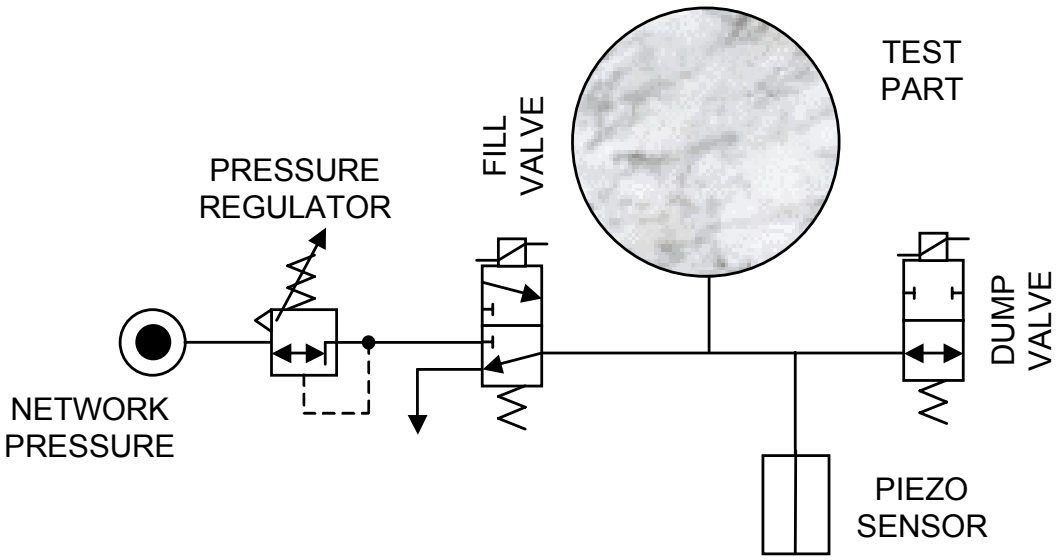
1. TECHNICAL CHARACTERISTICS OF THE F420P 71
2. MECHANICAL DEFINITION DRAWINGS OF F420P 72
3. CONVERSION TABLE 73
4. PARAMETERS STORED 74
5. VALVES CODES USED IN YOUR APPLICATION 75
6. USER NOTES 76

Index 77

PREAMBLE

1. DEFINITION OF THE ATEQ F420P

The **ATEQ F420P** is a compact air/air leak detector used to test the air tightness of parts on production lines. It is specially adapted for automatic and semi-automatic workbenches. The method used is based on the measurement of a small variation or drop in pressure with a piezzo sensor.



2. MEASUREMENT CHARACTERISTICS

2.1. MEASUREMENT RANGES

PRESSURE RANGE	MESUREMENT RANGE	ACCURACY	maximum RESOLUTION
-80 > -2 kPa (-800 > -20 mbar)	1 > 500 Pa	+/- 4 % of the full scale	1 Pa
	10 > 1000 Pa		
	10 > 5000 Pa		
	10 > 10000 Pa		
5 > 50 kPa (50 > 500 mbar)	1 > 500 Pa	+/- 4 % of the full scale	1 Pa
	10 > 1 000 Pa		
	10 > 5 000 Pa		
	10 > 10 000 Pa		
20 > 400 kPa (0,2 > 4 bar)	10 > 1 000 Pa	+/- 4 % of the full scale	10 Pa
	10 > 5 000 Pa		
	10 > 10 000 Pa		
	10 > 50 000 Pa		
50 > 900 kPa (0,5 > 9 bar)	10 > 5 000 Pa	+/- 4 % of the full scale	10 Pa
	10 > 10 000 Pa		
	10 > 50 000 Pa		
	100 > 100 000 Pa		

2.2. MECHANICAL PRESSURE REGULATION

20 kPa to 400 kPa / 50 kPa to 900 kPa.

For other specific pressures please contact ATEQ.

3. THE MAIN TYPES OF MEASUREMENT

The are two main measurement methods that can be performed by the **ATEQ F420P**, direct measurement or indirect measurement. These two methods apply to measurements taken both under pressure and in vacuum conditions.

The configuration is determined by the application and must be carried out prior to the use of the instrument.

3.1. DIRECT/PRESSURE DROP MEASUREMENT

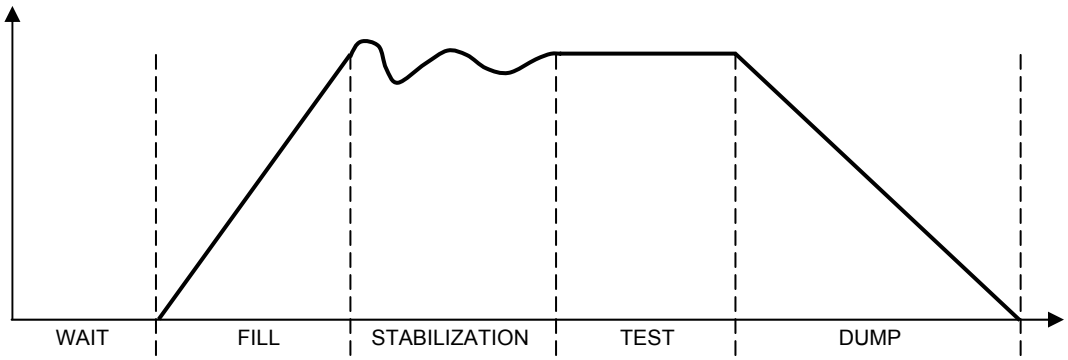
After filling the test part to the required pressure level, the instrument measures the drop in pressure.

At the end of a cycle, the **ATEQ** empties the components via the dump valve.

3.2. INDIRECT/PRESSURE RISE MEASUREMENT

The test part is placed in a sealed bell and the **ATEQ F420P** is pneumatically connected to the bell. The part is externally pressurised (with up to 20 MPa or 200 bar), and the bell is lightly pressurised. In the event of a part leakage, the pressure in the bell will rise. This method allows certain parts to be tested at high pressure levels whilst avoiding the associated constraints. The **ATEQ F420P** only tests and measures the pressure in the bell. In the event of a large leak, electronic monitoring of the pressure in the bell will switch the instrument to safety.

4. DIRECT MEASUREMENT, PRESSURISATION

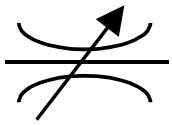
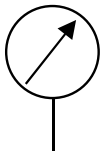
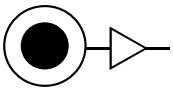
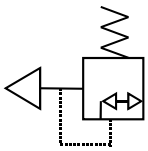
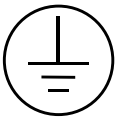
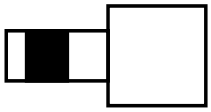
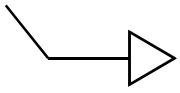
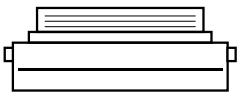
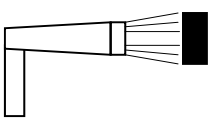


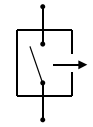
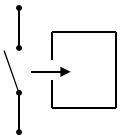
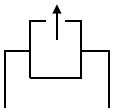
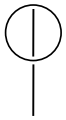
The measurement cycle consists of 5 phases:

	1	2	3	4	5	
Start	**Wait**	**Fill**	**Stabilisation**	**Test**	**Dump**	Cycle end

Start	Cycle start.
The **wait** time	The time during which the sealing connections are made to the test parts before the part is filled. The instrument may be fitted with the optional automatic connector (this option adds an extra valve). This valve is controlled for the duration of the cycle to enable the installation of the expandable joint connectors to be checked.
The **fill** time	Pressurisation of the test part. At the end of the fill time, the **ATEQ** instrument checks the test pressure. If this is not correct, the instrument will signal a test pressure error.
The **stabilisation** time	The test part is completely cut off from the air supply, but remains pressurised to the test pressure level. Pressure and temperature will then stabilise in the part. If the test pressure is incorrect (a large leak), the test pressure will drop rapidly, the instrument will not move on to the test mode and will indicate an error.
The **test** time	Time during which the pressure sensor measures the changes in pressure in the test part. The signal is electronically assessed and displayed, the part is then diagnosed as good or bad.
The **dump** time	Return of the part to atmospheric conditions.
Cycle end	Once the dump has been carried out, the instrument emits a cycle end signal and the automatic connector valve (optional) is deactivated. This valve can control one or more expandable connectors from the beginning to the end of the cycle.

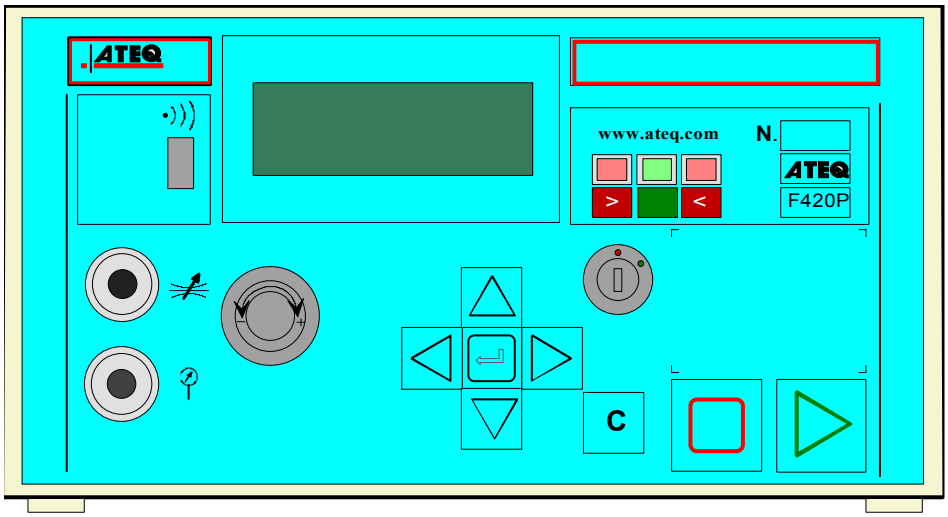
5. SYMBOLS PRESENTATION

Symbol	Name	Function
	Adjustable leak connector	Pneumatic connector for the plugging of a calibrated leak (ruby kind) or an adjustable leak.
	Pressure connector	Pneumatic connector for the plugging of a manometer for an external checking of the pressure.
	Pressure supply	of the air supply from the 6 bar network.
	Test circuit supply	Pneumatic connector (according to option) for the plugging of a supplementary pneumatic supply, used in the event of the test pressure being greater than 8 bar.
	Ground connector	Connector for the electric connection to the ground.
	Automatic connector	Pneumatic connector for the driving of an external logic or pneumatic components (pneumatic sealing connector).
	Connector	Connector for a pneumatic output.
	Connector	Connector for a pneumatic input.
	Warning!	Read and respect the instructions of the user manual, before connecting and using the instrument.
	Printer	Printer connection socket.
	Bar code reader	Bar code reader connection socket.

Symbol	Name	Function
	Output	Dry contact output.
	Input	Dry contact input.
	Infrared link	The receiver and transmitter of the infrared link is located here.
	Analogue output	Analogue output.
	Analogue input	Analogue input for the temperature sensor.

Chapter 1
INSTALLATION OF THE INSTRUMENT

1. APPEARANCE OF THE ATEQ F420P



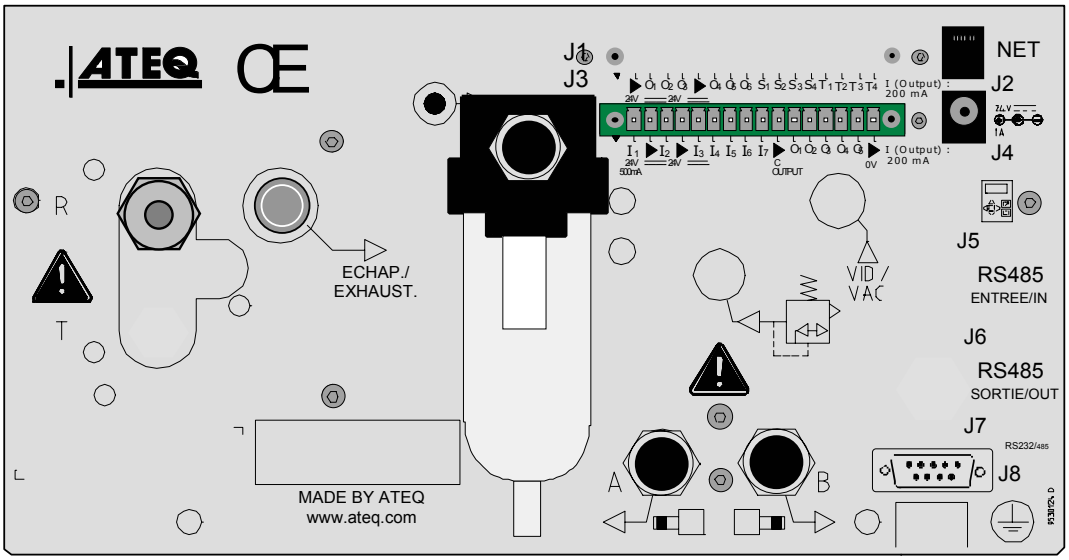
The **ATEQ F420P** is supplied in a moulded, painted sheet metal case and rests on rubber feet. The upper cover is attached to the main body by two screws.

The size of the casing has been reduced to facilitate the insertion of the instrument in the working environment.

A 24 V DC power supply unit is supplied with the instrument.

2. INSTALLATION OF THE INSTRUMENT

2.1. LAYOUT OF CONNECTORS ON THE F420P CABINET



2.2. CONNECTOR DETAILS

2.2.1. Electrical connectors

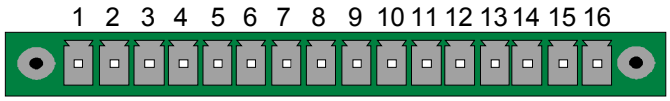
The **ATEQ F420P** operates on a voltage of 24V DC either:

✓ Using the external power supply delivered with the instrument.

2.2.1. 1) J2 Connector

Telephone socket. Not used.

2.2.1. 2) J3 Connector (I/O Inputs/Outputs)



PIN 1	Reset (IN 1)	DRY CONTACT INPUT (Activation by 24 V DC)
PIN 2	Common (+ 24 V)	
PIN 3	START (IN 2)	
PIN 4	Common (+ 24 V)	
PIN 5	Input program selection (IN 3)	
PIN 6	Input program selection (IN 4)	
PIN 7	Programmable input (IN 5)	
PIN 8	Not used	
PIN 9	Not used	
PIN 10	Common	DRY CONTACT OUTPUT 60V AC / DC Max 200mA Max
PIN 11	Part OK output	
PIN 12	Test part default output	
PIN 13	Not used	
PIN 14	Warning output	
PIN 15	Cycle end output	
PIN 16	0 V	

2.2.1. 3) Activating a program from the J3 connector inputs

To activate a program from the J3 connector inputs, you have to select pins 5 to 9 (one or more). Binary weight n + 1.

Pin combinations for program selection

Program number	Pin 5 (Input 3)	Pin 6 (Input 4)	Pin 7 (Input 5)
1	0	0	0
2	1	0	0
3	0	1	0
4	1	1	0
5	0	0	1
6	1	0	1
7	0	1	1
8	1	1	1

2.2.1. 4) J3 Connector (Binary inputs/outputs) programmable input

Input 5 (pin 7) parameters can be set in the **CONFIGURATION/CHANGIE I/O** menu.

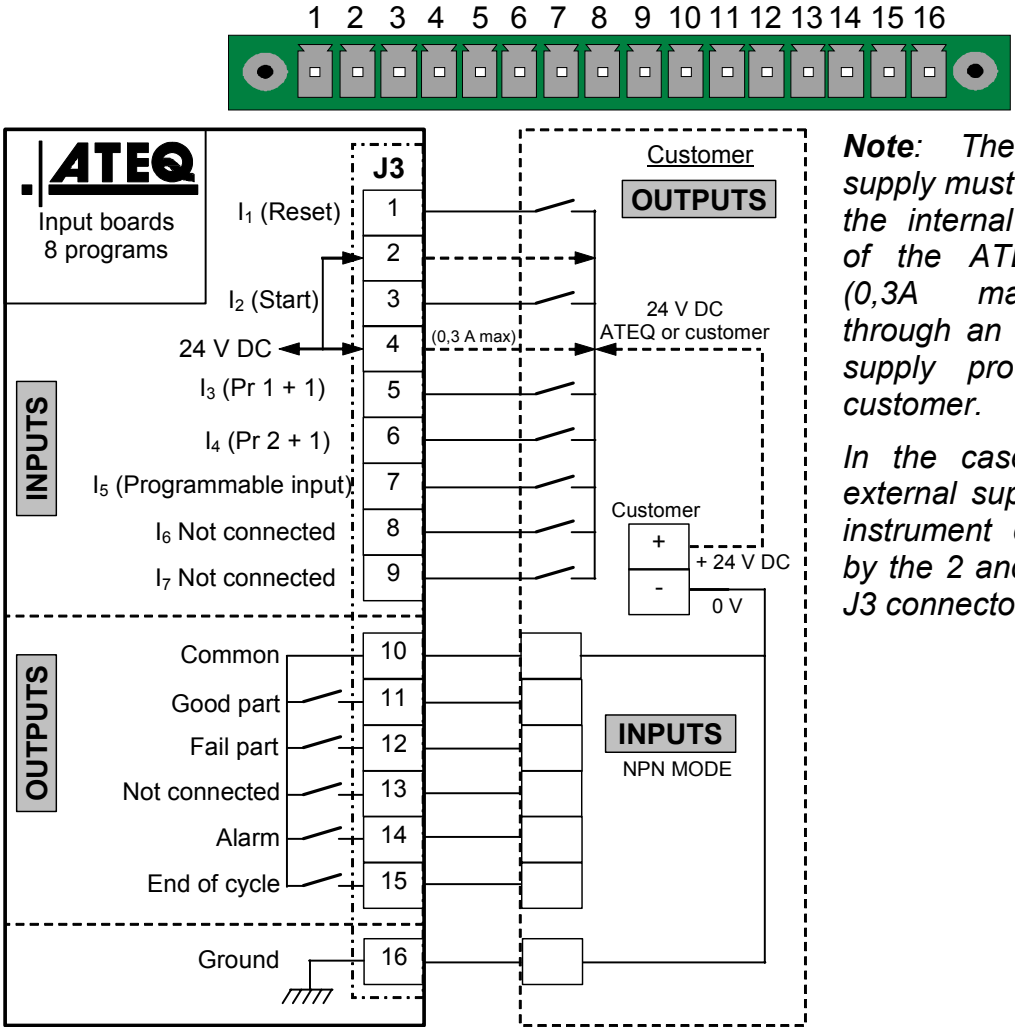
The functions which can be programmed and are available on this input are all the specials cycle:

- ✓ Program selection.
- ✓ Regulator adjust request.
- ✓ Infinite fill request.
- ✓ Piezo auto zero request.
- ✓ Auto test request.

Some possibilities appear only if the function is used.

2.2.1. 5) J3 Connector (binary inputs/outputs) diagram

a) PLC in NPN mode connection

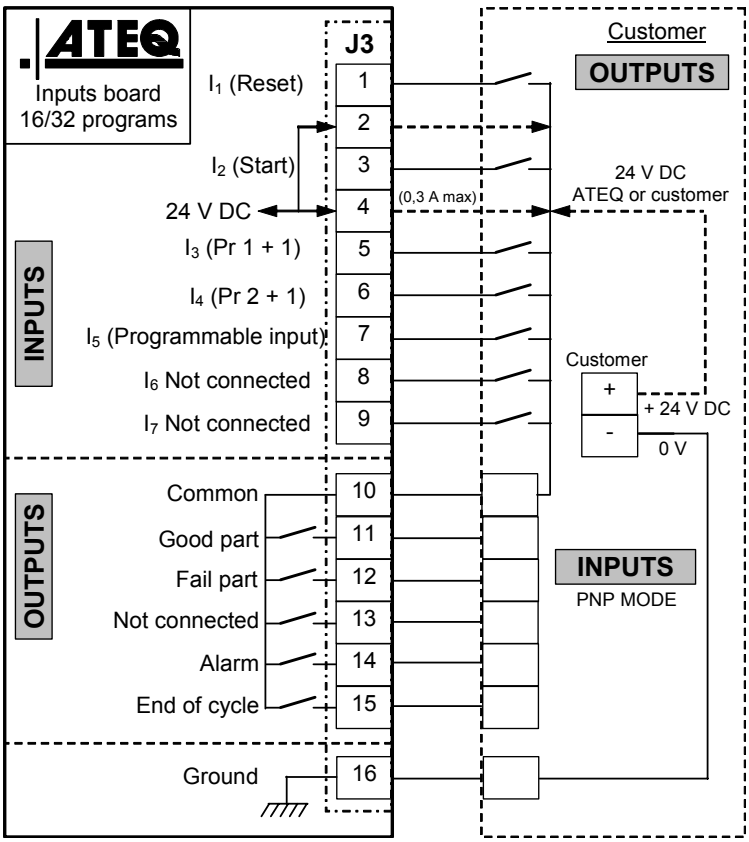


Note**: The 24V power supply must be provided by the internal power supply of the ATEQ instrument (0,3A maximum)* ***OR *through an external power supply provided by the customer.*

In the case of customer external supply, the ATEQ instrument can be supply by the 2 and 4 pins on the J3 connector too.

2.2.1. 6) J3 Connector (binary inputs/outputs) diagram

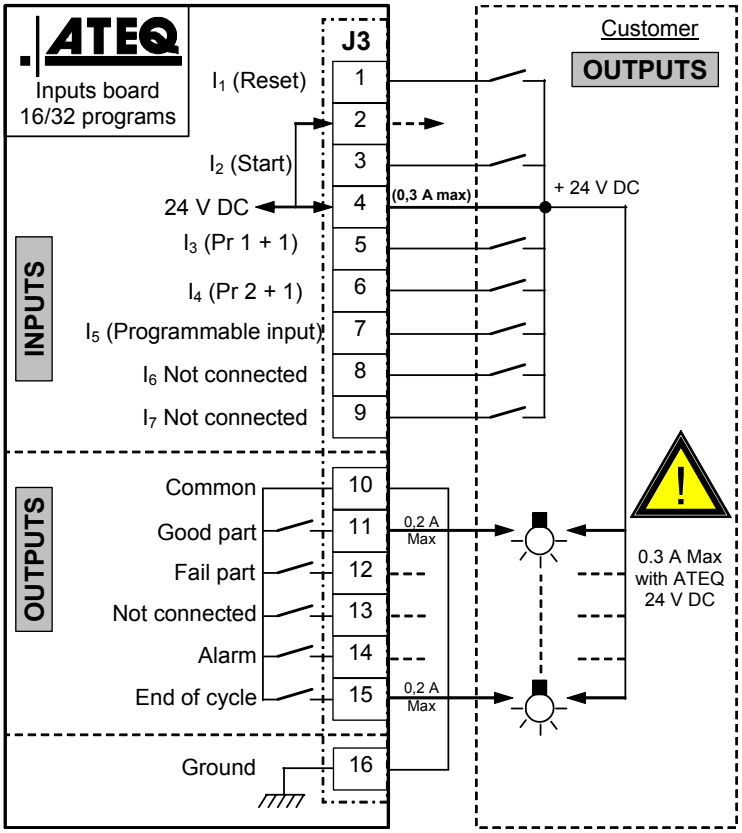
a) PLC in PNP mode connection



Note*: The 24V power supply must be provided by the internal power supply of the ATEQ instrument (0,3A maximum)* ***OR*** *through an external power supply provided by the customer.*

In the case of customer external supply, the ATEQ instrument can be supply by the 2 and 4 pins on the J3 connector too.

b) Lights connection



Note*: The 24V power supply must be provided by the internal power supply of the ATEQ instrument (0,3A maximum)* ***OR*** *through an external power supply provided by the customer.*

In the case of customer external supply, the ATEQ instrument can be supply by the 2 and 4 pins on the J3 connector too.

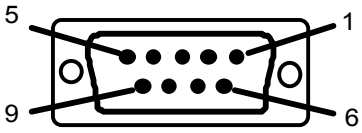
2.2.1. 7) J4 Connector

Used for the connection of the power supply.

The voltage must be 24VDC with minimum current 1.25 A.

The instrument can be supplied from the J3 connector relay board on the 24 V DC pin.

2.2.1. 8) J8 Connector (RS232)



Used for the connection of a printer, a bar-code reader, a PC or a memory module.

PIN 1	Not used	PIN 6	+ 5 V DC 200 mA Max
PIN 2	RXD Data reception	PIN 7	RTS request to send
PIN 3	TXD Data emission	PIN 8	CTS clear to send
PIN 4	Not used	PIN 9	Not used
PIN 5	Earth		

2.2.2. Pneumatic connectors

Pneumatic connectors can be on the front or rear panels of the **F420P** instrument.

2.2.2. 1) Automatic connector A

Used for the connection of an automatic pneumatic connector.

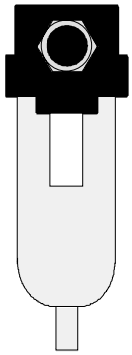
2.2.2. 2) Automatic connector B

Used for the connection of a second automatic pneumatic connector.

2.2.2. 3) Pneumatic input/output

This output allows the connection to the test part.

2.2.2. 4) Pneumatic supply

	Air is supplied via the filter located on the rear panel of the instrument. ***Note**: when an electronic regulator is used with test pressures above 800 kPa (8 bar) (normal service pressure), another "high pressure" input for the test circuit is installed on the instrument.*

It is essential that the air supplied is clean and dry. Even though there is a filter, supplied with the instrument, the presence of dust, oil or impurities may cause a malfunction.

When the instrument is working in vacuum conditions, impurities must be prevented from being drawn into it. For this purpose we strongly recommend that a suitable airtight filter is installed between the test part and the instrument. This filter can be supplied by **ATEQ**.

The presence of impurities, oil or humidity in the air may cause deterioration which will not be covered by the guarantee.

In accordance with ISO standard 8573-1 concerning classes of compressed air for measurement instruments in an industrial environment:

ATEQ recommends:

- Grain size and concentration CLASS 1 (0.1 µm and 0.1 mg/m^3)
- Dew point under pressure CLASS 2 (- 40° dew)
- Maximum concentration of oil CLASS 1 (0.01 mg/m^3)

ATEQ recommends the installation:

- of an air dryer to provide dry air at less than - 40° dew point,
- of a 25 micron and 1/100 micron double filter.

Optimisation of operation:

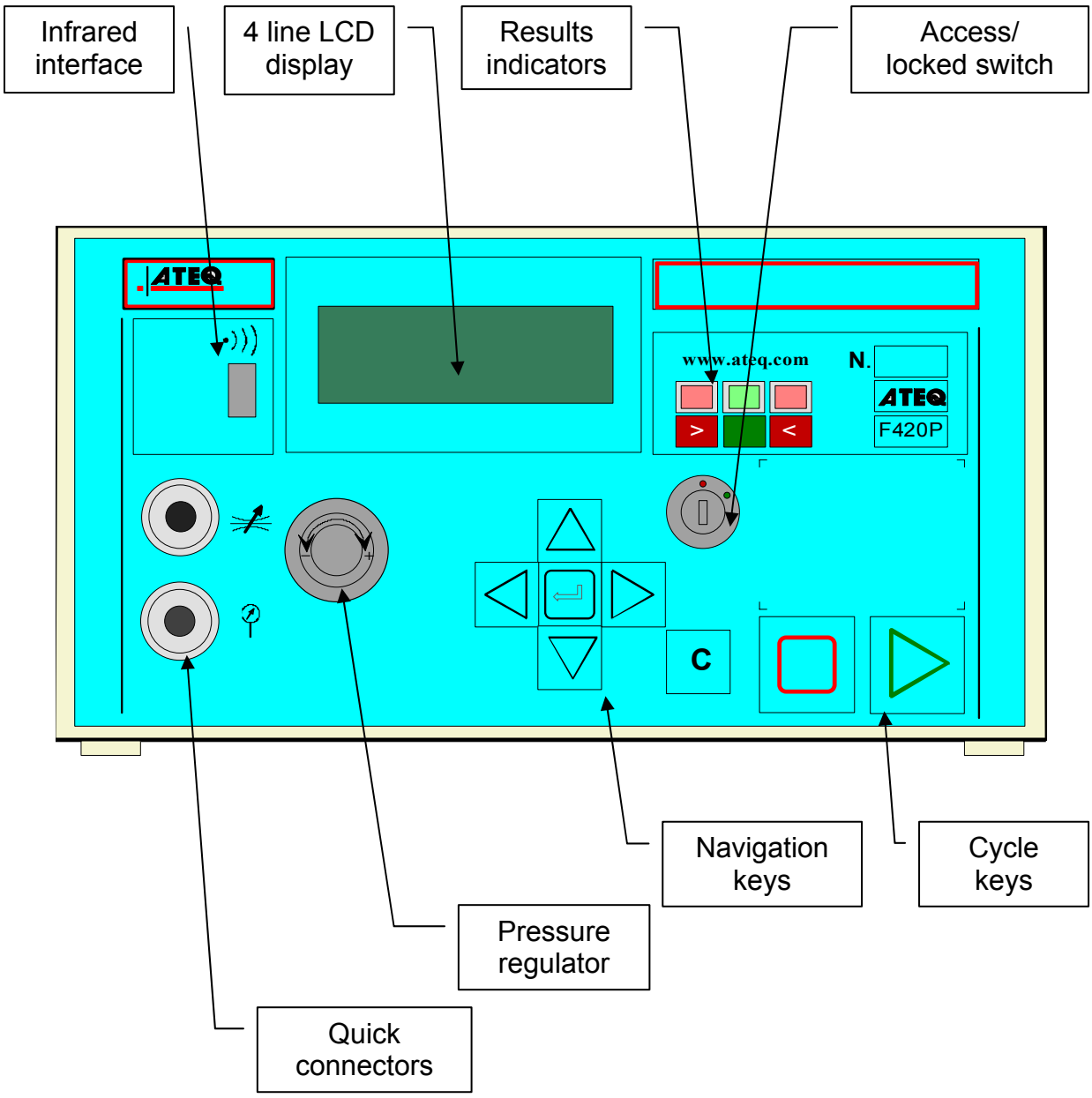
The supply pressure must always be between 4 and 8 bar to ensure that the pneumatic distributors operate with optimum efficiency.

When a mechanical regulator is used, the supply pressure must be a minimum of 100 kPa (1 bar) greater than the test pressure with a minimum of 400 kPa (4 bar).

If an electronic regulator is used, the regulator input pressure must be at least 10% greater than the value of full scale on the electronic regulator + 100 kPa (+ 1 bar).

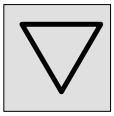
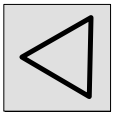
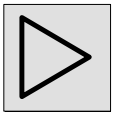
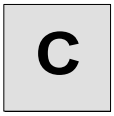
Chapter 2
USER INTERFACES

1. ATEQ F420P FRONT PANEL APPEARANCE

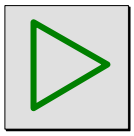
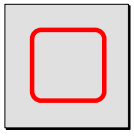


2. APPEARANCE OF THE KEYBOARD

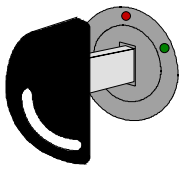
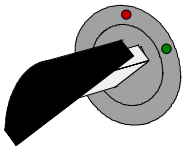
2.1. NAVIGATION KEYS

KEY	FUNCTION
	Scroll up or increase numerical values
	Scroll down or decrease numerical values
	Not used
	Not used
	ENTER key Opening a menu Entering a parameter Confirmation of a parameter
	« **C** » for **CANCEL** Return to the previous menu or function Escape without modifying a parameter

2.2. CYCLE KEYS

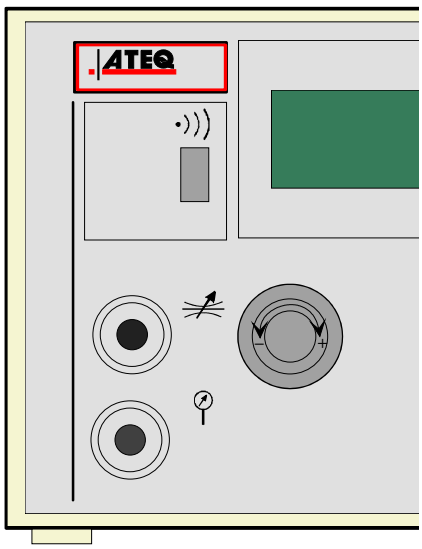
KEY	FUNCTION
	**START** key Starts a measurement cycle
	**RESET** key Stops a cycle in progress

3. LOCKABLE SWITCH

POSITION	FUNCTION
	**LOCKED** position. Access to adjustable parameters not possible.
	**ACCESS** position. Adjustable parameters may be accessed.

***NB**: whatever position the key is in (**LOCKED** or **ACCESS**), test cycles can be started and stopped.*

4. RAPID CONNECTORS



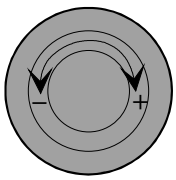
Two rapid connectors may be mounted on the front panel of the instrument.

These enable pressure and calibration to be checked easily. The first is used for the regulator circuit. It enables the value of the test pressure shown by the instrument, measured with a pressure gauge or the **ATEQ Leak/Flow Calibrator (CDF)**, to be checked. This connector is not part of the measurement circuit and cannot therefore interfere with the control.

The second is used to check the test circuit and enables, through the use of a calibrated leak expressed in cm^3/min or another unit, the calculation of the equivalent drop in pressure and, if required, the calibration in this unit.

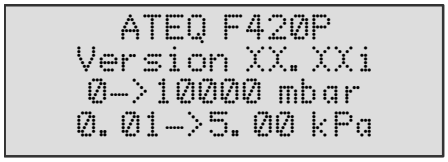
⚠ ***As this connector is part of the measurement circuit, all its connections must be air tight.***

5. REGULATOR



Used to adjust the test pressure

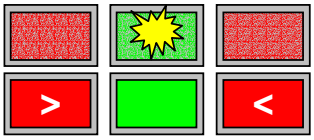
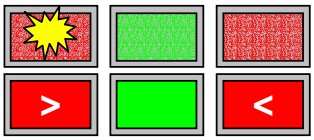
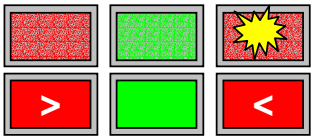
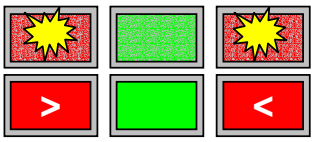
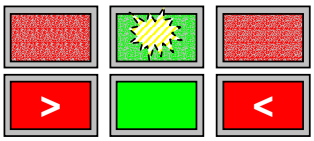
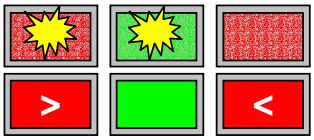
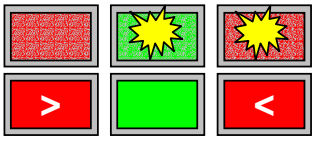
6. 4 LINE LCD DISPLAY



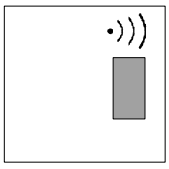
Used to display measurements and adjustable parameters. In the opposite example, XX.XXi represents the program version for the instrument.

7. FUNCTIONS OF THE INDICATOR LIGHTS

The symbol represents an indicator which is lit.

Test part OK indicator.	
Bad part indicator indicating a leak in excess of the reject threshold for pressure measurements or an increase in volume during vacuum condition measurements.	
Bad part indicator indicating a “negative” leak in excess in absolute terms of the reject threshold for vacuum measurements or an increase in pressure during pressure condition measurements.	
Warning.	
Stand-by (intermittently flashing indicator)	
Recoverable parts (pressure measurement) (indicators continuously lit)	
Recoverable parts (vacuum measurement) (indicators continuously lit)	

8. INFRA-RED INTERFACE



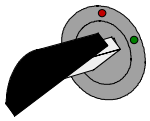
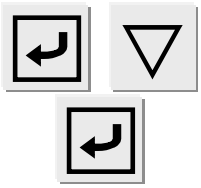
Not used.

Chapter 3
START-UP AND SETTINGS

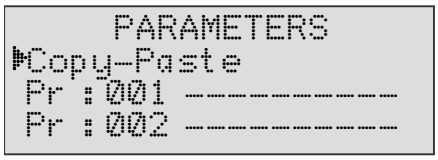
1. POWERING-UP THE ATEQ F420P

Supply the instrument with 24 V DC. When switched on, the instrument:		
- Displays the version and the full scale of the sensors…		ATEQ F420P Version XX.XXi 0->10000 mbar 0.01->5.00 kPa
…then displays the main menu.		CYCLE/Pr :001 PRESS = 0.000 bar READY

2. CREATION OF A TEST PROGRAM

To modify the parameters, turn the key to the **ACCESS** position.		RUN/Pr:001 PRESS = 0.000 bar READY
To access the main menu, press **ENTER**. In the main menu, place the cursor in front of the **PARAMETERS** menu. Confirm with the **ENTER** key.		MAIN MENU RUN PROG. : --- ▶PARAMETERS SPE CYCLE :Disabled
The **PARAMETERS** menu is used to manage test programs. ☞If the various programs to be created have different parameters, they must be created one by one. ☞If the programs have identical parameters, a base program can be created and then the **Copy-Paste** function can be used to duplicate the program as many times as necessary.		PARAMETERS ▶Copy-Paste Pr :001 ---------- Pr :002 ----------

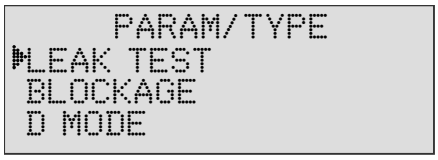
2.1. CHOICE OF THE PROGRAM NUMBER

Position the cursor in front of the chosen program number and confirm with the **ENTER** key.		

***NB:** the instrument have height programs maximum.*

2.2. TEST TYPE SELECTION

Four test types are available.

The **PARAMETERS** menu gives access to four possible types of test: leak test (**LEAK TEST**), pressure test (**BLOCAGE**), desensitised mode test (**D. MODE**) and an operator test (**OPERATOR**); see the following paragraph for explanations. Put the cursor in front of the required test type and confirm with the **ENTER** key.		

2.2.1. Leak test

The leak test is most suitable for measuring small leaks (pressure drop). The following formula is used to convert a leak expressed in units of flow to a drop in pressure

$$\Delta P\ (Pa/s) = \frac{F\ (cm^3/min)}{0{,}0006 \times V\ (cm^3)}$$

$F(cm^3/min)$	=	Leak flow	$V\ (cm^3)$	=	volume of the test part
0.0006	=	constant	ΔP (Pa/s)	=	pressure drop

Example:

Part which has dP/dt = 50 Pa/s			Part which has dP/dt = 1 Pa/s		
Test	Pa/s	Pa	Test	Pa/s	Pa
1 s	50	50	1 s	1	1
2 s	50	100	2 s	1	2
3 s	50	150	3 s	1	3
.	.	.	.	.	.
.	.	.	.	.	.
n s	50	nx50	n s	1	n

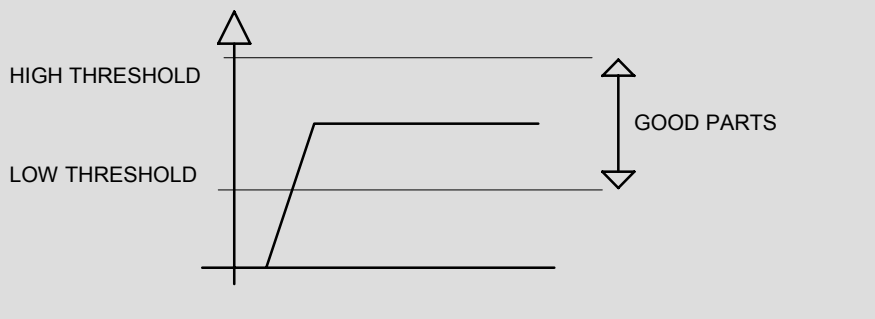
The choice of working in Pa or in Pa/s depends on the application.
In all events, it must not be forgotten that the full scale of the sensor in Pa or Pa/s is limited to 50 or 500 Pa depending on the instrument configuration.

2.2.2. Blockage test mode

The blockage mode is used for rough measurement of a flow, based on the measurement of back pressure. The standard pressure limits are used to classify the results as good or bad. The cycle only contains the fill phase and the measurement is carried out during this phase.

If the pressure measured is below the minimum limit, then the flow is too large.

If the pressure measured is in excess of the maximum limit, then the flow is too small.



2.2.3. Operator mode test

This type of test means that the operator can carry out operations on the part whilst under test, then confirm these operations using a "**START**" key if the operator test is good, or the "**RESET**" key if the test is failed.

2.3. PARAMETER SETTINGS

Once the test type is chosen, the test cycle parameters must be set.

The procedure to follow for setting the test parameters is identical in each case.

Example: Coupling time A.

First, position the cursor in front of the chosen parameter using the navigation keys (here, Coupl. A).	△ ▽	PARAM/pr001 TYPE : LEAK TEST ▶COUPL. A: 00.00 s FILL : 00.00 s
Then, confirm with the **ENTER** key. The cursor will move to the right of the display.	↵	PARAM/pr001 TYPE : LEAK TEST COUPL. A: 00.00 s◀ FILL : 00.00 s
Modify the value using the navigation keys.	△ ▽	PARAM/pr001 TYPE : LEAK TEST COUPL. A : 00.03 s◀ FILL : 00.00 s
Once the value is modified, confirm with the **ENTER** key.	↵	PARAM/pr001 TYPE : LEAK TEST ▶COUPL. A : 03.00 s FILL : 00.00 s
To move on to the next parameter, use the navigation keys.	△ ▽	PARAM/pr001 TYPE : LEAK TEST COUPL. A: 03.00 s ▶FILL : 00.00 s
To exit from the menu, use the **CANCEL** key.	C	PARAMETERS Cut-Paste Pr:001 LEAK ▶Pr:002 LEAK

2.3.1. Coupling time

Coupling times A and B are start of cycle parameters.

If there is no automatic connector, Coupling time A is part of the cycle.

If an instrument is fitted with an automatic connector, Coupling time A delays the pressurisation of the test part by allowing the activation of a first cycle connector at the test start. Coupling time B allows the activation of a second automatic connector. These Coupling times ensure better stabilisation of the seals placed on the test part.

☞Set this parameter using the method described in § 2.3.

2.3.2. Fill time

This is the time allowed for the pressurisation of the part to be tested. It must not be too long (waste of time) or too short (the pressure in the component is at risk of not being sufficient due to drops in pressure caused by temperature changes).

To determine the appropriate fill time, it is necessary to set the **Fill Time** in order to make it **Too Long** (TTLR), then to shorten it until a drop in pressure occurs due to thermal effects.

Determine the TTLR by using the following formula:

$$TTLR = \sqrt[4]{\text{volume in } cm^3 \text{ x test pressure in mbar}}$$

- ✓ Carry out a cycle. When the instrument switches to the stabilisation period, the pressure must remain stable.
- ✓ A pressure drop (since there will be no fall in pressure due to thermal effects) signifies the presence of a large leak; check the test part and the pneumatic assembly components, then start again.
- ✓ If the pressure remains stable, the part does not contain a large leak and the fill time is too long. Shorten it progressively by carrying out cycles until a drop in pressure is noticeable.
- ✓ As soon as a fall in pressure due to thermal effects appears, the fill time has become too short. Increase it slightly.

☞Set this parameter using the method described in § 2.3.

2.3.3. Stabilisation time

This time is used to stabilise the pressure in the test circuit.

It is possible that a change in pressure occurs due to thermal exchanges between the components. If the instrument takes a measurement too early, the instrument will indicate the presence of a large leak.

- ✓ To determine the correct stabilisation time, it is necessary to set a long time so that the reading at the end of the test time is equal to zero.
- ✓ Set the stabilisation time to four times the length of the fill time.
- ✓ Carry out a cycle. When the instrument switches to the test period, the pressure must remain at zero.
- ✓ If there is a drop in pressure, there is a small leak present. Check the test part and the pneumatic connections, then start again.
- ✓ If the pressure is stable, the part does not contain a small leak and the stabilisation time is therefore too long. Progressively shorten and carry out cycles (wait one minute between each cycle) until you see the appearance of a drop in pressure. This indicates that the stabilisation time has become too short. Increase it slightly.

☞Set this parameter using the method described in § 2.3.

2.3.4. Test time

The test time depends on the programmed reject level and operation mode.

In the dP/dt (Pa/s) mode, the variation in measured pressure is due to the drift in the pressure drop.

In the dP (Pa) mode, the pressure variation measured is the total of the pressure drop over the whole test time. This mode is more unstable, but is more sensitive. The instrument totals all the variations occurring due to variations in volume or temperature over the whole of the test time.

☞Set this parameter using the method described in § 2.3.

2.3.5. Dump time

The instrument will as default propose a dump time of zero. This must be set by carrying out several tests.

☞Set this parameter using the method described in § 2.3.

2.3.6. Pressure units

The different units are bar, mbar, PSI, Pa, kPa, MPa. .

☞ Set this parameter using the method described in § 2.3.

2.3.7. Maximum fill

This function is used to set a maximum limit for the fill pressure. A warning is triggered if this limit is exceeded.

When test time is infinite, the maximum fill pressure monitoring is inoperative. Care should therefore be taken to avoid excess pressure being applied to the part during the test.

☞ Set this parameter using the method described in § 2.3.

2.3.8. Minimum fill

This function is used to set a minimum limit for the fill pressure. A warning is triggered if this limit is not reached.

☞ Set this parameter using the method described in § 2.3.

2.3.9. Reject unit

Pa, Pa/s, (High Resolution) Pa, (High Resolution) Pa/s, Cal-Pa, Cal-Pa/s, cm^3/min, cm^3/s, cm^3/h, mm^3/s.

If a unit of flow is selected, two parameters will be added to the program:

- ✓ the choice of the flow calculation basis, in Pa or Pa/s
- ✓ the volume of the test part (+pipes).

There is a special "Cal learn" cycle to determine a basic unit of flow. (see chapter 4 § 3.5 "manual calibration").

***Note:** high resolution enables an extra figure to be displayed (i.e. 1/10th Pa)*

☞ Set this parameter using the method described in § 2.3.

2.3.10. Test reject

This function is used to set a limit level below which the part is considered to be bad.

☞ Set this parameter using the method described in § 2.3.

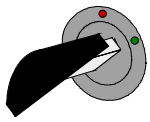
2.3.11. Functions

The **FUNCTION** menu gives access to additional parameters which must first be activated in the **CONFIGURATION** menu and then the **EXTENDED MENU**.

If no additional parameters are confirmed in the **EXTENDED MENUS**, the **FUNCTION** menu will be empty when selected.

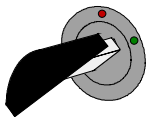
To activate these parameters refer to chapter 4 § 2.

3. DUPLICATION OF A TEST PROGRAM

To modify the parameters, turn the key to the **ACCESS** position.		
Starting from the main menu, position the cursor in front of the **PARAMETERS** function.	△ ▽	MAIN MENU RUN PROG.: 001 ▶PARAMETERS SPE CYCLE :Disabled
Confirm with the **ENTER** key. The cursor will appear in front of the Copy-Paste function. Confirm the function again using the **ENTER** key.	↵ ↵	PARAMETERS ▶Copy-Paste Pr :001 ENGINE Pr :002 HEAD
Next, confirm the **COPY** function**.**	↵	PARAM/Copy-Paste ▶COPY :Pr --- PASTE :Pr ---
Display the number of the program to be copied using the navigation keys. (In this case, program no.1).	△ ▽	PARAM/Copy-Paste COPY :Pr 001 ◀ PASTE :Pr ---
Confirm using the **ENTER** key.	↵	PARAM/Copy-Paste ▶COPY :Pr 001 PASTE :Pr ---
Place the cursor in front of **PASTE**.	△ ▽	PARAM/Copy-Paste COPY :Pr 001 ▶PASTE :Pr ---
Confirm with the **ENTER** key. Assign a number to this new program using the navigation keys (For example no.3).	↵ ▽ △	PARAM/Copy-Paste COPY :Pr 001 PASTE :Pr 003 ◀

Confirm with the **ENTER** key, The display confirms that the program has been copied.		COPY IN PROGRESS
The program no.1 parameters have now been copied into program no.3 parameters. In this example program no.3 is an exact copy of program n°1.		PARAM/Copy-Paste COPY : Pr 001 ▶PASTE : Pr 003
Press the **CANCEL** key twice to return to the main menu.	**C** **C**	MAIN MENU ▶PARAMETERS SPE CYCLE: Disabled CONFIGURATION

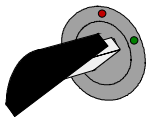
4. DELETING A PROGRAM OR A PROGRAM NAME

To modify the parameters, turn the key to the **ACCESS** position.		
Position the cursor in front of the **PARAMETERS** function. Confirm with the **ENTER** key.		MAIN MENU RUN PROG.: 001 ▶PARAMETERS SPE CYCLE : Disabled
Position the cursor in front of the program number or the program name to be deleted.		PARAMETERS Copy-Paste ▶Pr: 001 ENGINE Pr: 002 HEAD
Confirm once to enter the program.		PARAM/Pr001 ▶TYPE : LEAK WAIT A: 00.00 s WAIT B: 00.00 s
Confirm a second time to gain access to the delete menu. There are two possibilities: delete the program name or delete the whole program.		M/Pr001/TEST TYPE ▶Delete name Program reset
1°) Confirm a third time. The name of the program is deleted.		PARAMETERS ▶Copy-Paste Pr: 001 _____ Pr: 002 HEAD
2°) Place the cursor in front of Program reset.		M/Pr001/TEST TYPE Delete name ▶Program reset
Confirm with the **ENTER** key. The program is then deleted.		PARAMETERS ▶Copy-Paste Pr: 001 _____ Pr: 002 HEAD

***NB:** if the "**Program delete**" operation is carried out first, then the program name is also deleted.*

5. STARTING A CYCLE

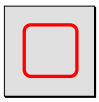
5.1. CHOICE OF THE PROGRAM TO BE RUN

Position the key in the **ACCESS** position.		
Starting from the main menu, place the cursor in front of the **RUN PROG.** function.	△ ▽	MAIN MENU ▶RUN PROG.: 001 PARAMETERS SPE CYCLE : Disabled
Confirm with the **ENTER** key.	↵	MAIN MENU ▶RUN PROG.: 001 PARAMETERS SPE CYCLE : Disabled
Display the number of the program required by scrolling through the numbers with the navigation keys.	△ ▽	MAIN MENU RUN PROG. : 004 ◀ PARAMETERS SPE CYCLE : Disabled
Confirm your choice with the **ENTER** key.	↵	MAIN MENU ▶RUN PROG. : 004 PARAMETERS SPE CYCLE : Disabled

6. STARTING A MEASUREMENT CYCLE

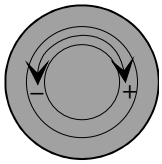
Press the **START** key to start a measurement cycle.	▷	RUN/Pr: 004 PRESS =0.500 bar READY
The cycle phases are displayed on the LCD window: **WAIT,** **FILL,** **STAB,** **TEST,** **DUMP.**		RUN/Pr: 004 PRESS =1.00 bar STABILISATION

7. STOPPING A CYCLE

Press the **RESET** key to stop the measurement. The display "**READY**" indicates that the instrument is ready to perform a new measurement test.		RUN/Pr: 004 PRESS =0.500 bar READY

8. SETTING THE TEST PRESSURE

8.1. MANUAL SETTING WITH A MECHANICAL REGULATOR

Position the cursor in front of the **SPE CYCLE** function and confirm with the **ENTER** key.		SPE CYCLE ▶Disabled Regulator adjust Infinite fill
Next, position the cursor in front of Regulator adjust and confirm with the **ENTER** key.		SPE CYCLE Disabled ▶Regulator adjust Infinite fill
The display confirms that the special cycle has been selected.		MAIN MENU RUN PROG. : 001 PARAMETERS ▶SPE CYCLE : Regul
Press the **START** key to launch a special cycle.		RUN/Pr: 001 PRESS = 355.5 mbar REGULAOR 1 ADJUST
Set the test pressure by using the regulator.		RUN/Pr: 001 PRESS = 1000 mbar REGULATOR 1 ADJUST
Once the pressure is set, press the **RESET** key to stop the special cycle.		RUN/Pr: 001 PRESS = 0.000 bar READY

Chapter 4
FUNCTIONS OF THE INSTRUMENT

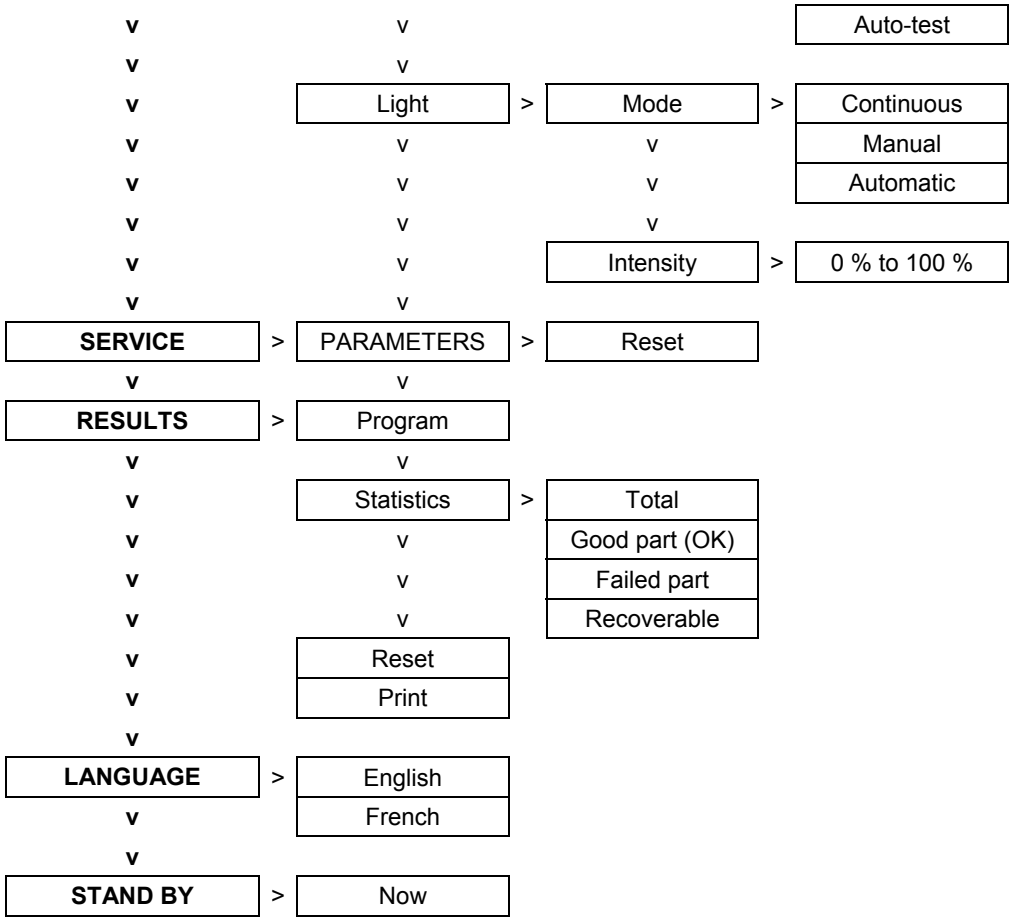
1. MENU STRUCTURE

1.1. MAIN MENU

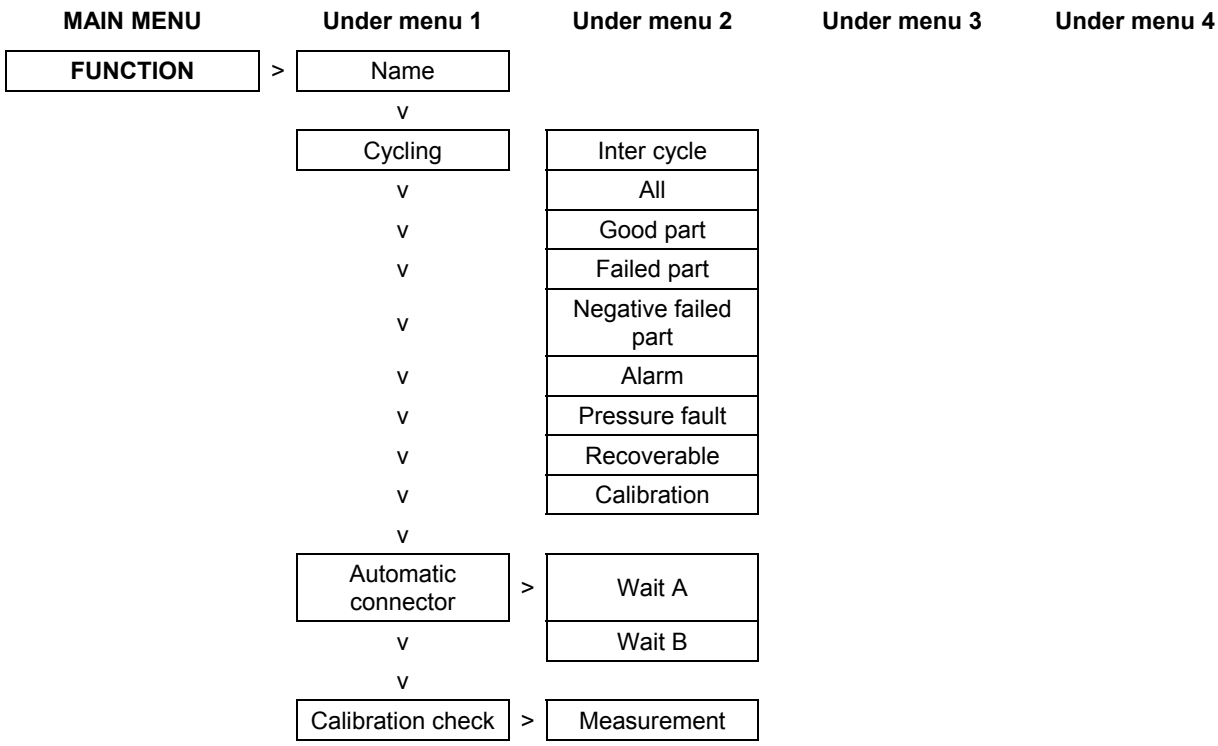
MAIN MENU	Under menu 1	Under menu 2	Under menu 3	Under menu 4
CYCLE PROG.	1 to 4			
PARAMETERS	Copy Paste	Copy		
		Paste		
	Programs 1 to 4	LEAK	Type : leak	Reset name
			Range	Delete program
			Wait A	
			Fill	
			Stabilisation	
			Test	
			Dump	
			Pressure unit	
			Maximum Fill	
			Minimum Fill	
			Reject unit	
			Reject	
			Negative threshold	
			Functions	See note 1
		Blockage	Type : blockage	Reset name
			Wait A	Delete program
			Fill	
			Dump	
			Pressure unit	
			Maximum Fill	
			Minimum Fill	
			Functions	See note 1
		Operator	Type: operator	Delete name
			Wait A	Delete program
			Test	
			Functions	See note 1
SPECIAL CYCLES	Disabled			
	Regulator adjust			
	Infinite fill			

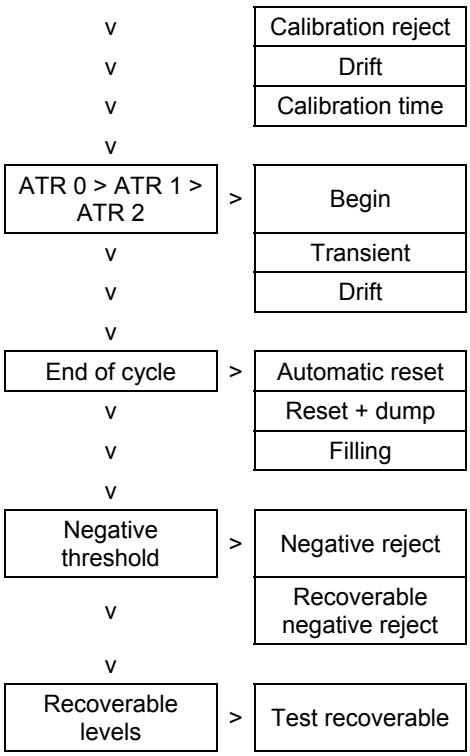
v		Piezo reset						
v		ATR learn						
v		CAL learn						
v		CAL check						
v								
CONFIGURATION	>	Extended menus	>	Name				
v		v		Cycling				
v		v		Automatic connector				
v		v		ATR 0				
v		v		ATR 1				
v		v		ATR 2				
v		v		Pre fill				
v		v		Cycle end				
v		v		Negative threshold				
v		v		recoverable limit				
v		v						
v		RS232	>	C540/F580		Print frame	>	Pressure
v		v		v				Program name
v		v		v				Lines before
v		v		v				Lines after
v		v		v				Inter line
v		v		v				Form feed
v		v		v				
v		v		Printer	>	RS parameters	>	Speed: 4800 > 9600 > 19200 > 28800 > 38400 > 57600 > 115200
v		v		v		v		Serial port: 1st-7bit-="0" > 1st-7bit-="1" > 1st-7bit-even > 1st-7bit-odd > 1st-8bit-none > 1st-8bit-="0" > 1st-8bit-="1" > 1st-8bit-even > 1st-8bit-odd >
v		v		v		v		
v		v		v		Print frame	>	Pressure
v		v		v		v		Program name
v		v		v		v		Lines before
v		v		v		v		Lines after
								Inter line
v		v		v		v		Form feed
v		v		v		v		
v		v		v		Send conditions	>	All results
v		v		v		v		Pass
v		v		v		v		Test fail
v		v		v		v		Reference fail
v		v		v		v		Alarm

v	v	v	v			Pressure out
v	v	v	v			Re-workable
v	v	v	v			Calibration
v	v	v	v			
v	v	v	Export	>		yes / no
v	v	v	v			
v	v	v	Print parameters			
v	v	v				
	v	v				
v	v	Modbus	>	Address	>	255 (fixed)
v	v			v		
v	v			RS parameters	>	Speed: 4800 > 9600 > 19200 > 28800 > 38400 > 57600 > 115200
v	v					Serial port: 1st-7bit-="0" > 1st-7bit-="1" > 1st-7bit-even > 1st-7bit-odd > 1st-8bit-none > 1st-8bit-="0" > 1st-8bit-="1" > 1st-8bit-even > 1st-8bit-odd >
v	v					
v	RS485	>	C540/F580			
v	v		v			
v	v	Modbus	>	Address	>	1 to 255
v	v			v		
v	v			RS parameters	>	Speed: 4800 > 9600 > 19200 > 28800 > 38400 > 57600 > 115200
v	v					Serial port: 1st-7bit-="0" > 1st-7bit-="1" > 1st-7bit-even > 1st-7bit-odd > 1st-8bit-none > 1st-8bit-="0" > 1st-8bit-="1" > 1st-8bit-even > 1st-8bit-odd >
v	v					
v	Security	>	Yes / No			
v	v					
v	Dump level	>	Pressure			
v	v					
v	Change I/O	>	Input 7	>	Program selection	
v	v				Regulator adjust	
v	v				Infinite fill	
v	v				Piezo auto zero	



1.2. "FUNCTIONS" MENU WHEN ACTIVATED



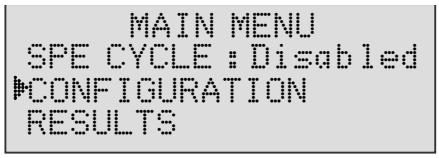
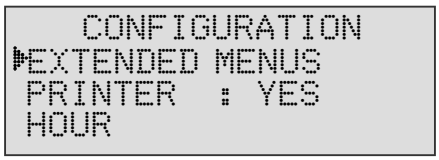
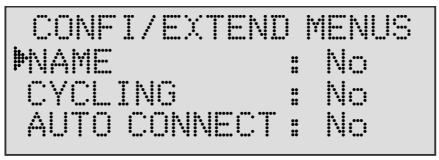
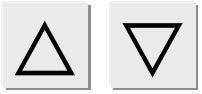
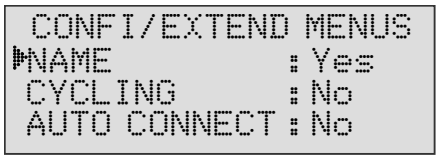
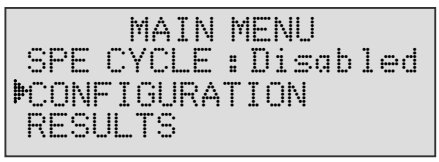

v
Calibration reject
v
Drift
v
Calibration time
v
ATR 0 > ATR 1 > ATR 2
>
Begin
v
Transient
v
Drift
v
End of cycle
>
Automatic reset
v
Reset + dump
v
Filling
v
Negative threshold
>
Negative reject
v
Recoverable negative reject
v
Recoverable levels
>
Test recoverable

2. CONFIGURATION MENU

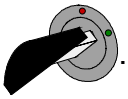
2.1. EXTENDED

The extended menus offer access to additional functions. If these functions are activated, they can be found in the **FUNCTION** menu when a program is created. If no additional functions are activated, the **FUNCTION** menu will be empty when a program is created.

2.1.1. Activation of the additional functions

In the main menu, place the cursor in front of the **CONFIGURATION** label		
Confirm using the **ENTER** key.		
Next, confirm the **EXTENDED** function with the **ENTER** key. The list of additional functions is then displayed.		
To activate a function (e.g. the **NAME** function), confirm it with the **ENTER** key. Next, choose **YES** with the navigation keys and confirm again with the **ENTER** key. Start the operation again if you need to activate other functions.	  	
Once all the chosen functions are activated, press the **CANCEL** key twice to return to the main menu.		

2.1.2. Setting the additional functions

✓ Place the key in the **ACCESS** position  .

✓ Create a new program (refer to chapter 3 §2 "Creation of a new test program").

✓ In the parameters list for this new program, confirm the **FUNCTIONS** parameter (refer to chapter 3 § 2.3 "Parameter setting").

⚠ Only the functions which have been activated using the above method will appear in the FUNCTIONS parameter.

2.1.3. List of additional functions

2.1.3. 1) Name

This function is used to customise a program, for example to name a program after the part to be tested.

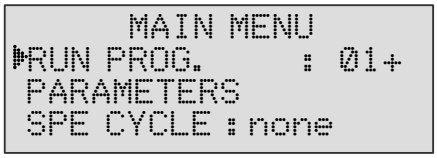
☞Select the option and enter settings if necessary.

2.1.3. 2) Chaining

This function enables several tests to be carried out by the instrument one after the other. The instrument offers 8 program sequencing criteria.

The sequencing order can be edited; the choice of the following program is defined in the parameters. By default the programs are sequenced according to their original number P+1.

When an active program is sequenced with another program, a "+" is displayed behind the program number.



Associated parameters to be set: NEXT PROGRAM, INTER-CYCLE (wait or coupling time between two cycles). Chaining conditions: ALL RESULTS (under all result conditions), PASS (part good), TEST FAIL (test part bad), REFERENCE FAIL (reference part bad), ALARM, PRESSURE OUT (pressure error), REWORKABLE (parts which can be repaired), CALIBRATION (calibration error).

☞Select the option and enter settings if necessary.

2.1.3. 3) Automatic connector

The automatic connector is a pneumatic control enabling the driving of an external logic (pneumatic sealing connector). This control is activated at the start of the cycle and is released at the end of the cycle (refer to “cycle end” diagram § 2.1.3.5).

If several programs are chained, the automatic connectors are activated according to the times set as parameters in the first program and are deactivated according to the times set as parameters in the last program in the chain.

They remain active throughout all cycles between the first and last program in the chain.

The various waiting times A are applied to the programs in between.

Associated parameters to be set: WAIT A, WAIT B.

☞Select the option and enter settings if necessary.

2.1.3. 4) ATR (Transient attenuation)

An ATR cycle enables time to be gained over a traditional cycle by enabling the stabilisation time to be reduced and absorbing the transient pressure. The transient pressure is an unexpected drop in pressure caused by a stabilisation time which is too short. The ATR may require a "learning" cycle to enable the transient pressure to be measured.

As the transient can evolve both negatively and positively, It is preferable to maintain identical Test and reference reject levels.

a) ATR 0

The initial value of the transient is known. Parameters must be set manually.

The ATR may only be used on parts which have identical behaviour during the test, in other words, parts which have an identical transient.

Associated parameters to be set: Initial (Initial value of the transient), Transit (actual, non modifiable value of the transient), Tolerance (Drift tolerance on acquisition of the transient, % of the reject level).

☞ Select the option and enter settings if necessary.

b) ATR1

The value of the transient is unknown. A special learning cycle must be carried out.

Associated parameters to be set: Initial (Initial value of the transient), Transit (actual and non modifiable value of the transient), Tolerance (Drift tolerance on acquisition of the transient, % of the reject level).

☞ Select the option and enter settings if necessary.

c) ATR2

Corresponds to ATR 1 but the potential leakage of the part is taken into account when the value of the transient is determined during the special cycle.

Associated parameters to be set: Initial (Initial value of the transient), Transit (actual and non modifiable value of the transient), Tolerance (Drift tolerance on acquisition of the transient, % of the reject level).

☞ Select the option and enter settings if necessary.

For ATR learning cycles, see paragraph 3.6. "ATR learning".

When a parameter is modified but no learning cycle has been carried out, an "**ATR**" error occurs. The "**alarm**" and "**end of cycle**" outputs are activated.

Learning may be carried out on a value greater than the reject level and the "**Pass**" and "**end of cycle**" outputs are then activated. However, the "**ATR**" fault appears if the difference between the transient and the initial value is greater than the reject level.

2.1.3. 5) Cycle end

This function enables different cycle ends to be chosen, depending on the configuration of the instrument (connection to a PLC).

a) Relay sequencing related to different cycle ends

In order to interface the **ATEQ F420P** with its environment (PLC, PC …), the following timing charts supply the details of the sequencing of the electrical outputs (relay board on the J3 connector) and pneumatic outputs (automatic connectors), depending on the commands entered on the front panel or through the J3 connector (START, RESET).

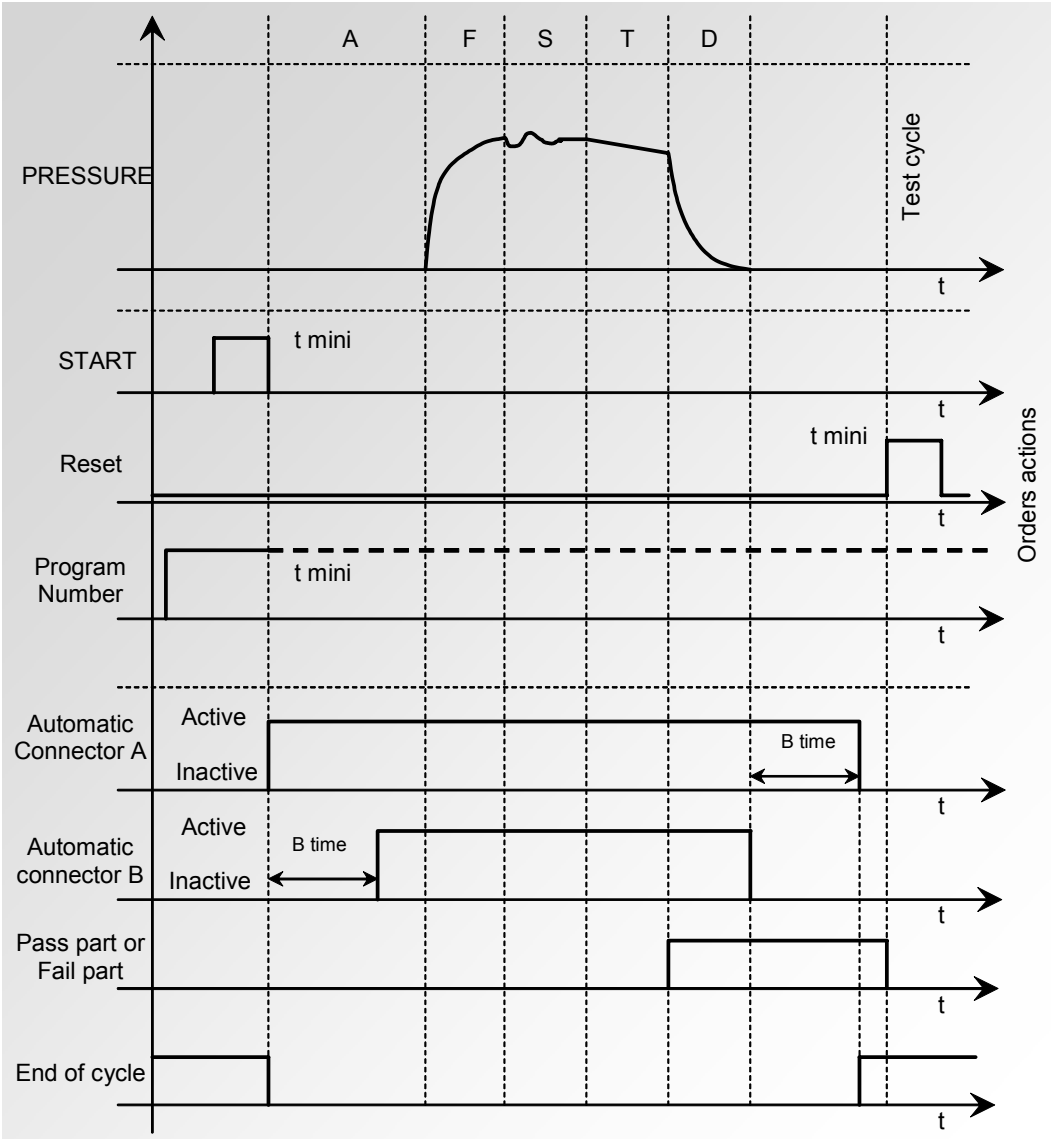
Legend	
A	Wait time for automatic connector A
B	Wait time for automatic connector B
F	Fill time
S	Stabilisation time
#	Unspecified time occurring between the programmed test time and the pressing of the reset key.
T	Test time
D	Dump time
START	Press the key on the front panel or make a contact between pins 2-3 on the J3 connector.
RESET	Press the key on the front panel or make a contact between pins 1-2 on the J3 connector.
Automatic Connector	Active (high level) : the pneumatic output is active (air output) Inactive (low level) : the pneumatic output is inactive (no air output)
BP or GP	Bad part or Good part relay on the J3 connector
EoC	End of cycle relay on J3 connector
t mini	Minimum time to accept an entry, 500 ms on connector J8 in the central module and 50 ms on connector J3 on a head.

⚠ ***Actual times are not those displayed but those on the print-out.***

b) "Automatic RESET" cycle end

If the part is OK, the Part OK relay will be activated as soon as the test ends and remains so until the start of the following cycle. Following the dump time, the end of cycle relay is activated.

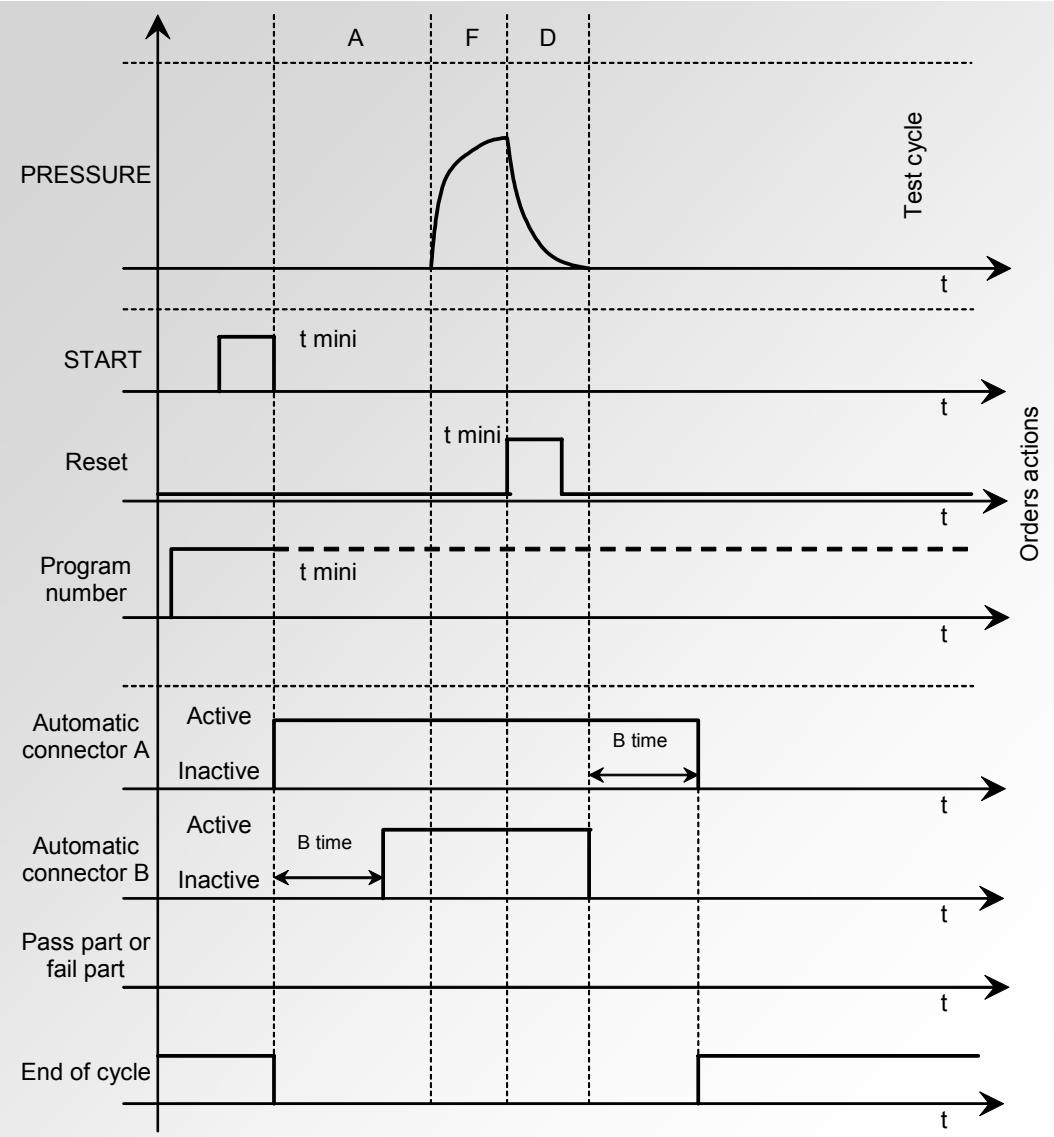
If the part is bad, the bad part relay is activated as soon as the test is completed. The instrument automatically dumps and sends a cycle end signal. A new cycle can then be launched.



The active program is the one selected before starting up. It remains active even if the program inputs on the connector are no longer activated. This selection can only be modified during the inter cycle period.

To return to program 1, when a cycle is not in progress, press any of the program selection inputs.

c) Ending a cycle with the RESET key ("Automatic RESET" Cycle end)



The active program is the one selected before starting up. It remains active even if the program inputs on the connector are no longer activated. This selection can only be modified during the inter cycle period.

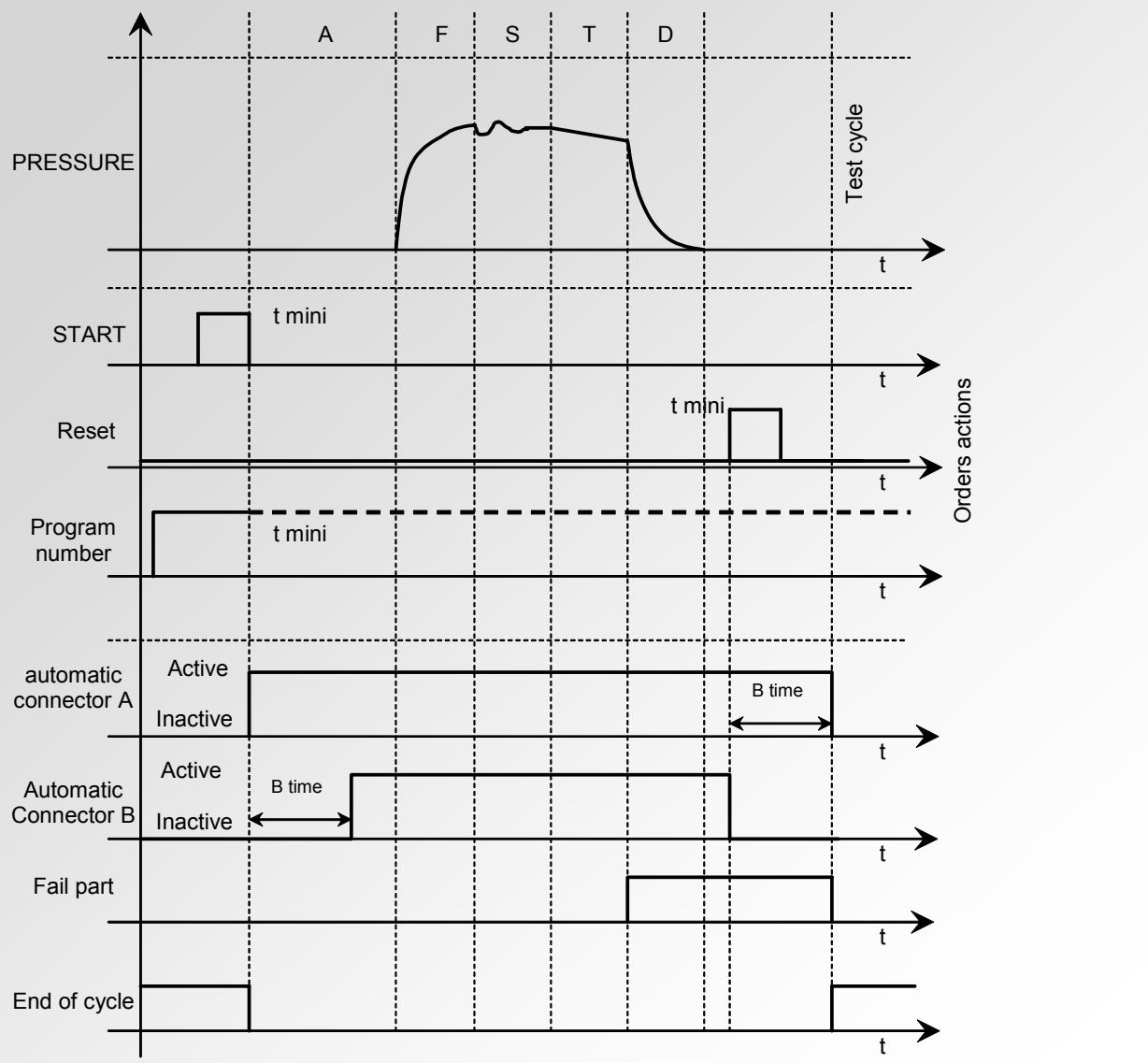
To return to program 1, when a cycle is not in progress, press any of the program selection inputs.

d) "RESET + dump" cycle end (automatic dump)

If the part is OK, the part OK relay is activated as soon as the test time is finished, and remains so (only in position 2) until the next cycle is launched.

At the end of the dump time, the end of cycle relay is activated.

If the part is Bad, as soon as the test time is over, the bad part relay is activated and remains so until the end of the cycle. The dump is then carried out. The cycle can be ended by pressing the **RESET** key.



The active program is the one selected before starting up. It remains active even if the program inputs on the connector are no longer activated. This selection can only be modified during the inter cycle period.

To return to program 1, when a cycle is not in progress, press any of the program selection inputs.

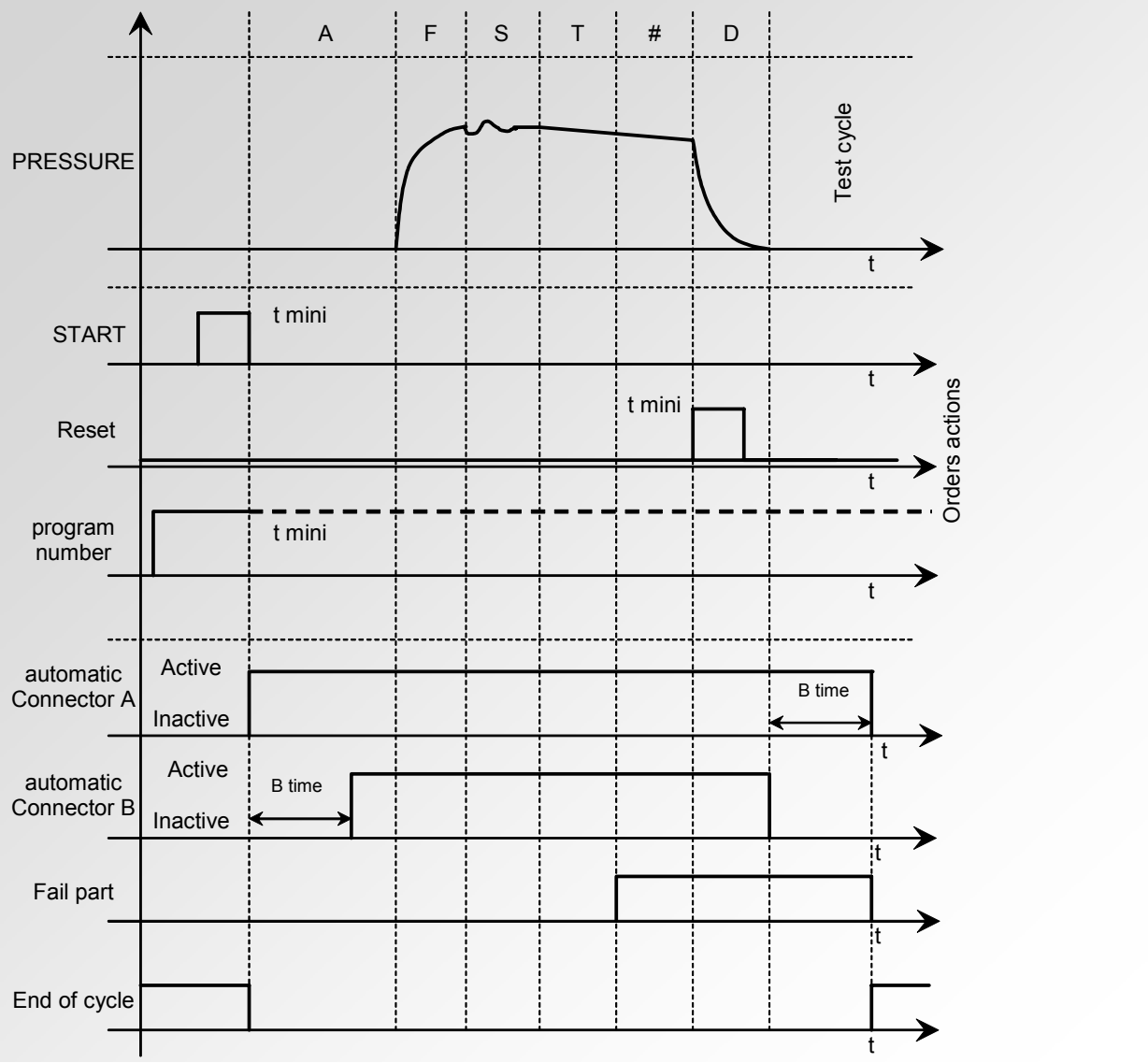
e) "Fill" cycle end

If the part is OK, the good part relay is activated at the end of the test time and remains so till the start of the next cycle.

At the end of the dump time, the end of cycle relay is activated.

If the part is bad, as soon as the test time is finished the relay becomes and remains activated.

The instrument waits for a reset from the operator or the PLC to start the dump time and send the end of cycle signal.



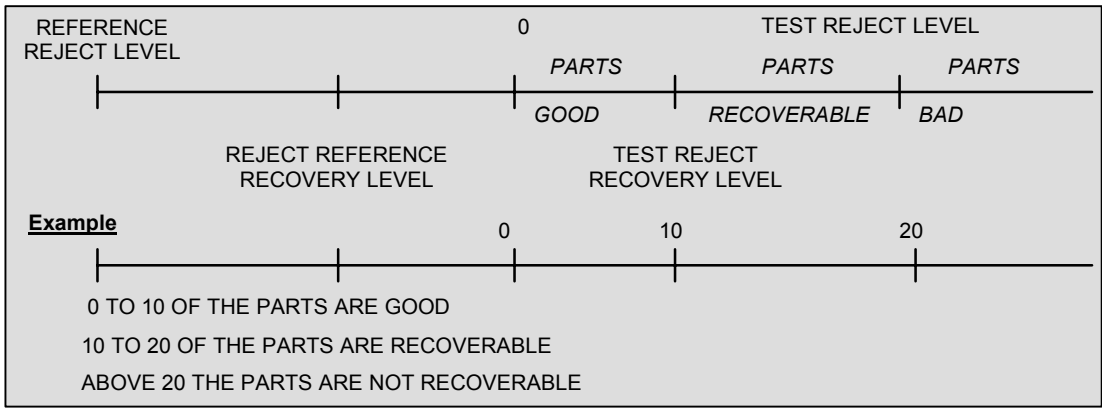
2.1.3. 6) Negative threshold

This parameter allows the setting of a reject level for a leak of "negative" conventional value. This type of leak is uncovered in the event of vacuum condition tests or in pressure measurement due to changes in the ambient temperature.

☞ Select the option and enter settings if necessary.

2.1.3. 7) Recovery limits

This option offers the option of two reject levels: non-tolerance level (the bad part is not recoverable) and recoverable reject level (the part is bad but may be reworked to become acceptable. This option is particularly used in casting, when parts are intended for treatment via impregnation).



The associated parameters to be set are: RECUP Test.

For recoverable parts, with multi-head configuration on the central unit or on the heads themselves, the Pass (PB) and Fail (PM) outputs are both activated simultaneously.

☞ Select the option and enter settings if necessary.

2.2. RS232

2.2.1. C540/580

This function enables the configuration of the instrument so that it may be supervised by an ATEQ central module.

☞ Select the option and enter settings if necessary.

2.2.2. Print frame

Not operational.

2.2.3. Printer

This function enables the configuration of the instrument to enable the printing of the program data (parameters) as well as the test results. When the option is activated (YES), each time a cycle is started, the test results are systematically printed.

☞ Select the option and enter settings if necessary.

2.2.3. 1) RS parameters

These parameters enable the configuration of the instrument enabling it to communicate with the printer.

Associated parameters to be set: Speed, Stop byte, number of data bytes, parity.

☞Select the option and enter settings if necessary.

2.2.3. 2) Print frame

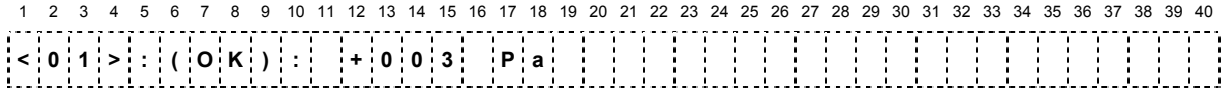
This function enables the configuration of the results printout.

Associated parameters to be set: PRESSURE (Display or not of the test pressure), Prog. name (Display of the program name when set), Lines before (number of lines before the result), Lines after (number of lines after the result), Inter line (space between each line), Form feed (new page).

2.2.3. 3) Frame format

The results frame is based on 40 columns.

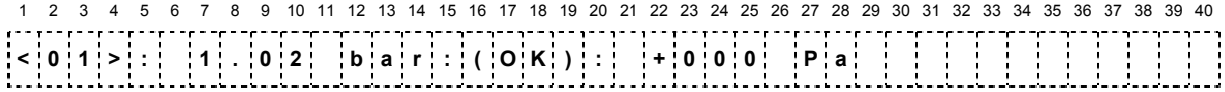
a) Example for test OK result



Frame detail:

Columns	Characters
1	<
2-3	Figure indicating program number
4	>
5	:
6	(
7-8	2 letters indicating OK for good part TD bad test part RD bad reference part
9	)
10	:
11	SPACE
12	+, - or nothing
13 - 14 -15	3 figures indicating the leak value
16	SPACE
17 > XX	2 to 6 letters indicating the unit of measurement

b) Example for a test result with pressure



c) Example for a result with fault

```
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
< 0 1 > : A L : F . S .   p i e z o
< 0 0 > : A L : L O W   P R E S S U R E
< 0 0 > : A L : H I G H   P R E S S U R E
```

Frame detail:

Columns	Characters
1	<
2-3	Number indicating program number
4	>
5	:
6 – 7	2 letters AL for ALARM
8	:
9 > XX	Error message relating to the fault

2.2.4. Sending conditions

With this function you can choose which data is to be printed on the results sheet.

Associated parameters to be set: **ALL** (all test results), **OK** (number of good parts), **T. BAD** (number of bad test parts), **R. BAD** (number of bad reference parts), **WARN.** (number of times the alarm has been triggered), **PRESS DEF.** (number of times pressure was incorrect), **RECUPERABLE** (number of recoverable parts), **CALIBRATION**.

☞ Select the option and enter settings if necessary.

2.2.5. Exporting

This function can be used to create and send a special results frame which can be processed by a PC using Microsoft Excel.

This frame is of the same type as the print parameters frame except that the different character strings follow each other and are separated by a punctuation mark which enables the various boxes to be entered automatically in Microsoft Excel.

This frame is operated by connecting a computer to the instrument's RS 232 link.

☞ Select the option and enter settings if necessary.

2.2.6. Print parameters

When this option is confirmed the test parameters are printed immediately.

2.2.6. 1) Example of parameter print frame

```
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
Version 01.01t
Pr 01
TYPE : LEAK
WAIT A : 00.1 s1 s
FILL. : 01.0 s
STAB. : 01.0 s
TEST : 02.0 s
DUMP : 01.0 s
Max. FILL : 2.40
Min. FILL : 1.60
Test REJECT: 010
Ref. REJECT: 000
```

2.3. SECURITY

This function deactivates the **START** and **RESET** keys on the instrument front panel. Programs can only be started from the instrument inputs (J3 connector).

☞ Select the option and enter settings if necessary.

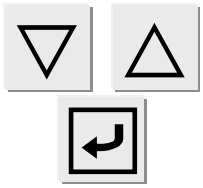
2.4. LIGHTING THE SCREEN

Screen illumination can be programmed and modified. The lighting can be adjusted according to the ambient conditions or the user's choice.

There are three lighting modes:

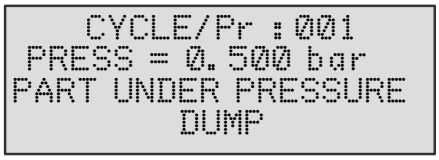
- ✓ **continuous** mode, display screen permanently lit whatever the conditions
- ✓ **manual** mode, the screen remains lit for 20 minutes and if the keyboard has not been used by the end of this period the screen shuts down and only relights when the keyboard is touched again.
- ✓ **automatic** mode, which is identical to manual mode, with illumination of the screen also if an action is carried out from the external inputs (rear connectors)

Using these three modes, the lighting intensity of the screen can be programmed from 0 % (screen off) to 100 % (maximum lighting intensity).

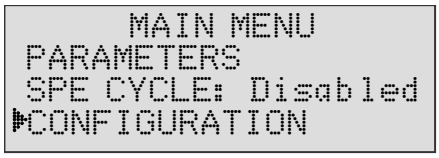
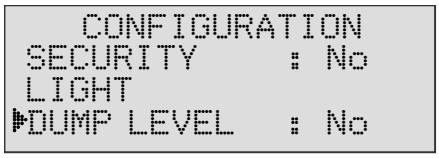
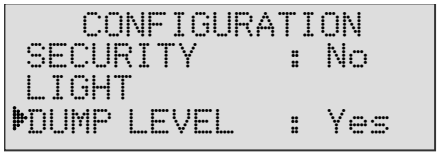
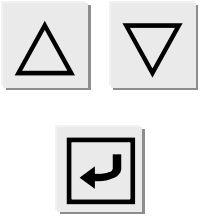
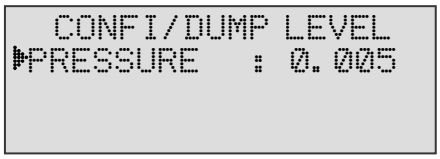
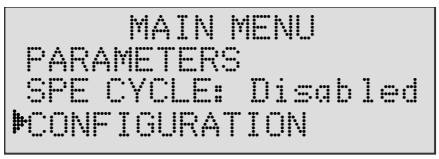
In the main menu, position the cursor by the **CONFIGURATION** menu then confirm by pressing **ENTER** .		MAIN MENU PARAMETERS SPE CYCLE: Disabled ▶CONFIGURATION
Move the cursor down until it is in front of the **LIGHT** menu then confirm by pressing **ENTER.**		CONFIGURATION PRINTER : No SECURITY : No ▶LIGHT
Place the cursor in front of **MODE** to choose the required lighting mode and confirm using **ENTER.**		CONFI/LIGHT ▶MODE :CONTINOU INTENSITY : 45 %
Select the lighting mode and confirm using **ENTER.**		CONFI/LIGHT/MODE ▶CONTINOUS MANUAL AUTO
To return to the previous menu, press the **C** button once		CONFI/LIGHT ▶MODE :PERMANEN INTENSITE: 90 %
To select the lighting intensity for the display, place the cursor in front of the **INTENSITY** menu and confirm using **ENTER.**		CONFI/LIGHT ▶MODE :CONTINOU INTENSITY : 45 %
Then select the lighting intensity from 0 % (off) to 100 % (maximum luminosity) and the new lighting intensity will be applied as soon as **ENTER** is pressed.		CONFI/LIGHT ODE :CONTINOU ▶INTENSITY : 75 %

2.5. DUMP LEVEL

A message "**Part under pressure**" is displayed and the instrument don't gives the cycle end status if at the end of the dump time the pressure of the tested part is higher than the configured threshold.



This function is parameterized in the "**Configuration**" menu.

In the main menu, position the cursor by the **CONFIGURATION** menu then confirm by pressing **ENTER**.		
Move the cursor down until it is in front of the **DUMP LEVEL** menu then confirm by pressing **ENTER**		
Validate by **YES** the **DUMP LEVEL** function.		
Then adjust the minimal dump level monitoring pressure, when the pressure in the tested part will be less than this threshold, the "End of cycle" output will be activated.		
To return to the previous menu, press the **C** button twice.		

2.6. I/O CONFIGURATION

2.6.1. Input 5 (IN5)

This menu is used to configure programmable input 5 on connector J3 on the 8 programs input/output board.

Refer to Chapter 1, paragraph 2.2.1.4) "Connector J3 (binary Inputs/Outputs) programmable input".

The various functions which can be set on input 5 are: "Program selection", "Valve Auto-test", "Regulator adjust", "Infinite fill", “Piezo auto zero”.

These functions represent all the special cycles available.

***NB**: to activate one of these functions, it must activate the input 5 (IN5) and the operator is pressing simultaneously the "Start" key.*

⚠ *If the current run program is not created, none of these function appears in the **"I/O Configuration"** menu, only the program selection menu is accessible.*

3. SPECIAL CYCLES MENU

3.1. SPECIAL CYCLES AVAILABLE

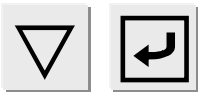
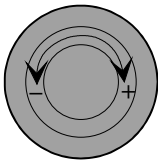
The following list shows all the special cycles which are possible those available will vary depending on what is checked in the expanded menus or according to the optional extras requested at the time of manufacture of the instrument.

Special cycle	Function
✓ Inactive	No special cycle selected.
✓ Regulator adjust	Cycles used to set the regulator.
✓ Infinite fill	Cycle used to put test part under pressure for infinite time.
✓ Piezzo auto reset	Cycle used to carry out forced reset of the piezzo transducer and the electronic regulator.
✓ Calibration check by volume	Cycle started manually by the operator to carry out calibration check by volume with a good part.
✓ CAL learning	This cycle is used to carry out learning in calibrated Pascal or Pascal/sec mode on a known standard leak.
✓ CAL check	This cycle is used for auto-diagnostics in calibrated Pascal mode (see previous function) within a tolerance determined by percentage limits.
✓ ATR learning	This cycle is used to enter the ATR parameters if they are not known. This should be done after each start-up of the instrument, or after a long period with no test cycles.

To run a special cycle, select it in the "special cycles" menu, then press the ▷ button. To stop it, press the □ button. In some cycles the stop is automatic.

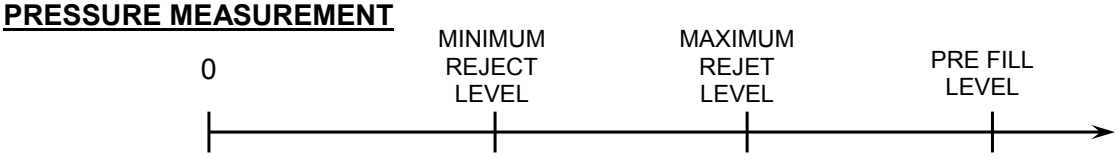
3.2. REGULATOR

This special cycle enables the main regulator pressure to be set.

Position the cursor in front of **SPE CYCLE** and confirm using the **ENTER** key.		SPE CYCLE ▶Disabled Regulator adjust Infinite fill
Next , position the cursor in front of Regulator adjust and confirm using the **ENTER** key.		SPE CYCLE Disabled ▶Regulator adjust Infinite fill
The display confirms that the special cycle has been selected.		MAIN MENU RUN PROG.: 005 PARAMETERS ▶SPE CYCLE:Regul
Press the **START** key to start the special cycle.		RUN/Pr :001 PRESS = 355.5 mbar REGULATOR 1 ADJUST
Adjust the value of the pressure with the regulator.		RUN/Pr :001 PRESS = 500.0 mbar REGULATOR 1 ADJUST
Once the pressure is adjusted, press the **RESET** key to stop the special cycle.		RUN/Pr :001 PRESS = 0.000 bar READY

***Note**: In the case of a test on empty, the negative pressure levels retain their mathematical "order".*

PRESSURE MEASUREMENT

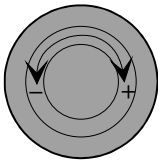


EMPTYING MEASUREMENT

3.3. INFINITE FILL

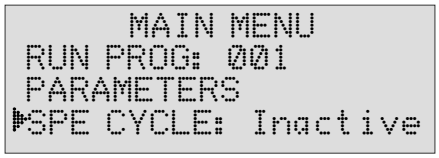
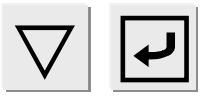
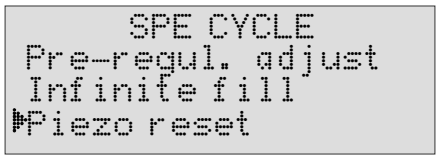
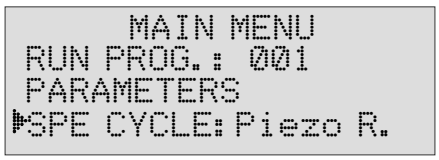
It is possible to carry out an infinite fill with the instrument, in other words, a permanent flow of air at the test pressure in order to locate leaks (set-up adjustment...).

If the assembly allows it (risk of sudden disconnection of part under pressure) it is preferable, in the case of infinite fill, to have a dump time of zero so as not to draw in liquid if there is a leak (when looking for leaks using a soapy water based product).

In the main menu, place the cursor in front of the **SPE CYCLE** function and confirm using the **ENTER** key.		MAIN MENU CYCLE PROG.: 001 PARAMETERS ▶SPE CYCLE: Inactive
Next, place the cursor in front of **Infinite fill** and confirm using the **ENTER** key.		SPE CYCLE Regulator adjust Pre-regul. Adjust ▶Infinite fill
The display confirms that the special cycle has been selected.		MAIN MENU CYCLE PROG.: 001 PARAMETERS ▶SPE CYCLE: Inf. fill
Press the **START** key to start a new cycle.		CYCLE/Pr :001 PRESS = 355.5 mbar FILL
Adjust the test pressure with the regulator.		CYCLE/Pr :001 PRESS = 1000 mbar FILL
To stop the cycle, press the **RESET** key.		CYCLE/Pr :001 PRESS = 1.00 bar READY

3.4. PIEZZO RESET

Used for compulsory reset to zero of the piezzo sensor.

In the main menu, place the cursor in front of **SPE CYCLE** and confirm using **ENTER**.		
Next, place the cursor in front of **Piezzo Reset** function and confirm using **ENTER**.		
The display confirms that the special cycle has been selected.		
Press the **START** key to start the reset.		
Once the reset is carried out, the cycle ends automatically.		

3.5. MANUAL CALIBRATION

3.5.1. CAL Learning (calibration)

If the 4 units of flow are not appropriate for the application, it is possible to go to calibrated mode (manual). To do this, a learning cycle must be carried out so that a calibration value will correspond to a pressure drop.

To access this special cycle, select the unit **Cal-Pa** or **Cal-Pa/s** as a reject unit when creating a program (for selection of units, see chapter 3 § 2.3 "Setting parameters").

Then the special learning cycle must be carried out, either from the special cycles menu or from input 5 on connector J3 programmed for this function, or via a programmed function key on the optional RC5 keypad, if this is installed.

The first CAL learning cycle must be done using the special cycles menu so that a CAL target which is different to zero can be entered.

On these outputs we have:

- "Pass" and "end of cycle" if the target is lower than or equal to the test reject level,
- "Fail" and "end of cycle" if the target is greater than the test reject level.

In the main menu, place the cursor in front of the **SPE CYCLE** function and confirm using the **ENTER** key.		MAIN MENU RUN PROG.: 001 PARAMETERS ▶SPE CYCLE: Disabled
Next, place the cursor in front of the **CAL. learn** function and confirm using the **ENTER** key.		SPE CYCLE Infinite fill Piezo reset ▶CAL. Learn.
The display confirms that the special cycle has been selected.		SPE C/CAL. Learn INSTRUCT. : 0.000◀ R. UNIT : Cal-Pa
Set the target calibration **INSTRUCT** which will be used as the base unit using the navigation keys.		SPE C/CAL. Learn INSTRUCT. : 0.000◀ R. UNIT : Cal-Pa
Confirm using the **ENTER** key, even if the value remains unchanged.		MAIN MENU RUN PROG.: 001 PARAMETERS SPE CYCLE: Cal
Press the **START** key to start the learning cycle. At the end of the cycle, the readout displays the test results in the calibration unit.		CYCLE/Pr : 001 PRESS = 0.505 bar LEAK = 1.5 Cal-Pa READY

Once carried out, the calibration cycle will end of its own accord.		CYCLE/Pr : 001 PRESS = 355.5 mbar READY

***Note**: The CDF (leak flow calibrator) can be used to calibrate the instrument.*

3.5.2. CAL check

This special cycle is used to verify calibration in calibrated mode. See explanation in previous paragraph. The CAL check cycle checks whether the calibration has drifted beyond the limits set as a percentage. If these have been exceeded, an alarm will be triggered and a calibration cycle or an instrument check will be required.

If the opposite is the case the "Pass" and "end of cycle" or "Fail" and "end of cycle" outputs are activated depending on the measurement made in comparison with the reject level.

In the main menu, position the cursor beside **SPE CYCLE** and confirm using **ENTER**.		MAIN MENU RUN PROG. : 001 PARAMETERS ▶SPE CYCLE: Disabled
Then place the cursor beside **CAL check** and confirm by pressing **ENTER**.		SPE CYCLE Piezo auto-zero CAL. Learn. ▶CAL. check
Press the **START** button to run the check cycle. The check cycle will stop automatically.		MAIN MENU RUN PROG. : 001 PARAMETERS ▶SPE CYCLE: CAL chck
At the end of the cycle, the display gives the test result in the unit of calibration.		RUN/Pr: 001 PRESS = 2.00 bar LEAK = 2 Cal-Pa READY (OK)

3.6. ATR LEARNING

If the transient values are not known, a transient learning cycle must be carried out so that the instrument can calculate and enter the values. These learning cycles are located as shortcuts in the special cycles menu, on input 5 of connector J3 programmed for this function or on a programmed function key on the optional RC5 keypad, if this is installed.

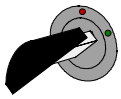
If no transient learning has been carried out, the message **ATR ERROR** will appear.		RUN/Pr:001 PRESS = 1.50bar LEAK = ATR ERROR READY (NO OK)
To carry out the learning, select the **SPE CYCLE** menu.		MAIN MENU RUN PROG. : 001 PARAMETERS ▶CYCLE SPE : Disabled
Then select the **ATR Learn** menu**.**		SPE CYCLE Infinite fill Piezo auto zero ▶ATR Learn.
The display confirms that the special cycle has been selected.		MAIN MENU RUN PROG. : 001 PARAMETERS ▶CYCLE SPE : ATR
Press the **START** button to start the learning cycle. At the end of the cycle, the display gives the test result for the good part.		RUN/Pr:001 PRESS = 1.50 bar LEAK = 002 Pa READY (OK)
The instrument carries out a test cycle, then continues the cycle by carrying out a learning cycle. When the cycle has been completed, the transient values are recorded.		RUN/Pr:001 PRESS = 1.50 bar LEAK = 002 Pa ATR Learn.
To view the transient values, press **ENTER**.		ATR2 ▶Begin. : -000 Transient : -003 DRIFT : 020 %

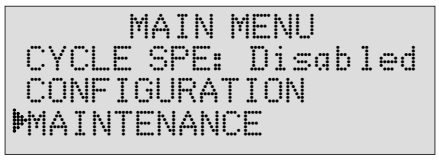
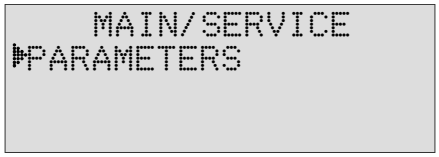
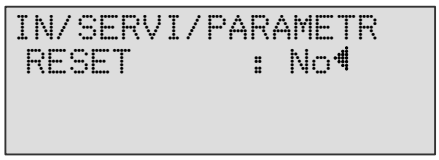
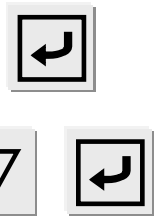
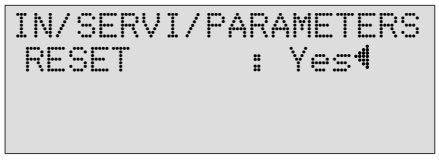
***Note**: these values can be modified manually.*

4. MAINTENANCE MENU

This menu is used to manage the memory containing the test cycle parameters.

- ✓ Erase maintenance parameters menu: used to delete the current configuration.

To access the menu, turn the key switch to the **ACCESS** position. 

In the main menu, place the cursor in front of **SERVICE** and confirm using **ENTER**.		
Then place the cursor in front of **PARAMETERS** and confirm using **ENTER**.		
Then place the cursor in front of the action required: **ERASE**: delete current parameters and return to initial configuration. and confirm using **ENTER**.		
To activate an operation, confirm using **ENTER**. Then choose **YES** using the arrows then confirm again using **ENTER**.		

5. RESULTS MENU

This function is used for:

- ✓ the detailed display of the test results: number of parts tested, number of good parts, number of bad reference parts, number of bad parts, number of recovered parts, number of times the alarm is triggered (each indicator is expressed as a % value),
- ✓ the resetting of the results memory,
- ✓ printing of the results (number of good parts, number of bad parts).

6. LANGUAGE MENU

This function is used to select the instrument language.

Two languages can be stored in the instrument.

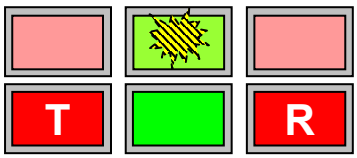
7. STAND BY MENU

This function is used to switch off the instrument without disconnecting it. Standby can be immediate or programmed with start and stop times.

There are two ways to achieve immediate standby:

Either through the standby menu,

Or by pressing the **RESET** button for more than three seconds.

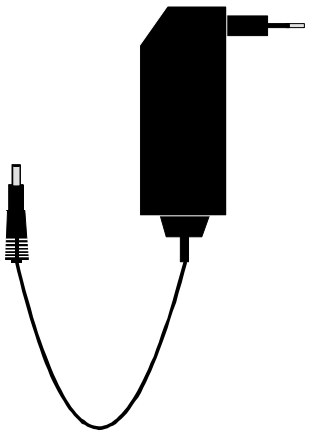
***Note**: when the instrument is on standby, the display is off and only the yellow indicator light flashes approximately every 3 seconds.*		
To reactivate the instrument, simply press any key on the front panel or activate any input.		

☞ Select the option and enter settings if necessary.

Chapter 5
ACCESSORIES

1. ACCESSORIES SUPPLIED WITH THE INSTRUMENT

1.1. POWER SUPPLY



The power supply of the **F420P** converts a network voltage (120 to 240 V AC) into a 24 V DC low voltage supply. It has no power switch and works as soon as it is plugged in. It is protected against surges and short circuits via a thermal fuse (Do not use any other type of fuse).

2. OPTIONAL ACCESSORIES

2.1. CALIBRATED LEAK

Calibrated leaks are used to check the instrument's calibration.

PRESSURE	Master leak type										
	A	**B**	**5**	**C**	**D**	**50**	**E**	**F**	**G**	**1000**	**5000**
2 kPa (20 mbar)			1,5	3,12	6,6	18	31,2	1,24	2,05	4,2	53
5 kPa (50 mbar)		2,3	4	7,4	17,5	42	1,3	2,6	5,25	11,3	132
15 kPa (150 mbar)	2,82	6,7	12	23	55	2,2	4	8,2	17	35,5	338
30 kPa (300 mbar)	4,8	12	24	46,8	2,12	3,6	7,6	22,4	40	74,5	700
50 kPa (500 mbar)	10	25	48	1,4	3,5	8	15,5	31	63	150	1142
100 kPa (1 bar)	23	56	1,8	3,3	8	19	37	74	149	360	2230
200 kPa (2 bar)	55	2,3	4,6	8,5	21	47	89	194	380	830	4343
400 kPa (4 bar)	2,5	6,6	12,1	23,3	56	125	220	540	1030	1500	8750
1 MPa (10 bar)	11,5	29	50	95	198	420	705	2310	3700	4450	

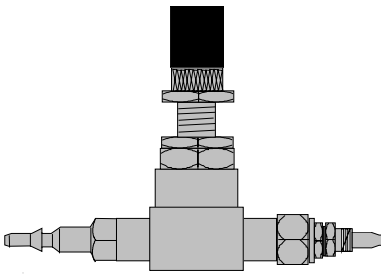
kPa.cm^3/h (bar.cm^3/h) **kPa.cm^3/min** (bar.cm^3/min)

Note:** the values indicated above are given for information and can vary by +/- 20%. The true rate is precisely measured before delivery with an accuracy of +/- 5% up to 1Mpa.cm^3/min (10 bar.cm^3/min) and +/- 3% from this value. **Special master leaks can be manufactured on request, within 5% of the requested value.

- ✓ The calibrated leaks must be used with clean dry air.
- ✓ These leaks must not be dipped in water. It is essential that they are stored in their case after usage.
- ✓ The leaks must be checked periodically by the company's metrology department or by **ATEQ's** metrology service.
- ✓ Check that there is an O-ring seal and that it is in good condition.
- ✓ The instrument zero check must be done by replacing the leak with a sealing connector and not by sealing off the leak itself.
- ✓ To check that the leak has not been blocked, attach a piece of flexible tubing to the leak and submerge its extremity in water to watch for bubbles. Only with pressure regulation and not vacuum.

2.2. NEEDLE VALVE AND LEAK/FLOW CALIBRATOR (CDF)

2.2.1. Needle valve

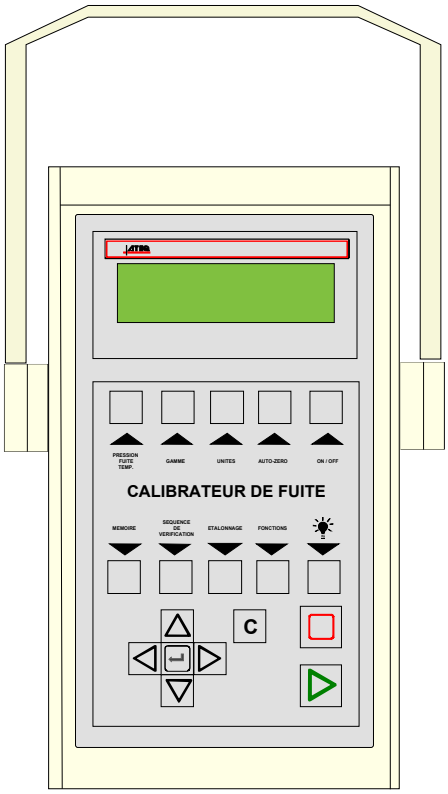


Needle valves are used to calibrate the leakage limits. These valves have an adjustable leak and depending on the model allow adjustments of between a few cm3/h to several l/min.

These valves can be easily disturbed and therefore require the frequent use of some means of checking the setting (eg : SAGA 4000).

***Note:** it is strongly recommended that you do NOT leave a needle valve permanently connected on a leak detection machine with automatic calibration every "n cycles".*

2.2.2. CDF (Leak/flow Calibrator)



The **Leak/Flow calibrator** is a multiple range **ATEQ** flow meter intended for checking leak testing equipment and particularly **ATEQ** instruments. It measures a loss of charge with a differential sensor, which is connected to a calibrated flow tube.

2.3. AUTOMATIC CONNECTORS WITH EXPANDABLE JOINTS

ATEQ automatic connectors are used so that accurate and reliable assemblies can be built to check air tightness. They simplify the work of the operator as they are self-locking thanks to the use of a pneumatic valve supplied from the mains compressed air supply. Several connectors may be controlled by the same remote, powered by an **ATEQ** or another logic.

They adapt easily to a large number of fittings and apertures of varied dimensions. Their use ensures that non-machined walls can be guaranteed airtight.

There are four basic versions of **ATEQ** automatic connectors :

- ✓ SA for external connections,
- ✓ Si for internal connections,
- ✓ SAG and SIG for threaded and tapped connections.

They are either in anodised aluminium or stainless steel as standard. Different types of joints are available depending on the elasticity required.

2.3.1. Operation

The connector is positioned manually or automatically using a jack or cylinder.

Compressed air is allowed through the control aperture via a three part valve. The pressure pushes the cylinder which squashes the connector. The air tightness is therefore perfect and there will be no leakage in the connector seals.

2.3.2. Standard dimensions

SAG and SIG have been designed for threaded and tapped caps. For the time being, they are available in gas norm. Sizes, which are: 1/2", 3/4", 1", 11/4", 11/2", 2", BSP.

The SA and SI are designed for smooth nozzles, with dimensions from 3 to 80 mm for the external diameters (SA), and from 10 to 75 mm for the internal diameters (SI).

2.4. FILTRATION KIT

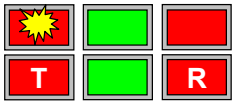
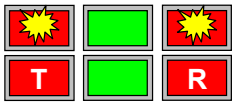
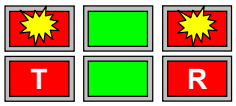
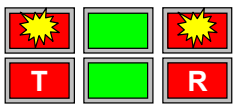
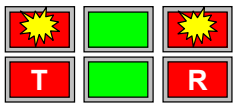
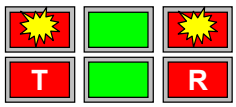
Clean, dry air must be used to ensure the reliability of the instruments.

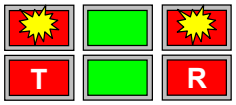
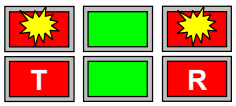
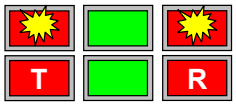
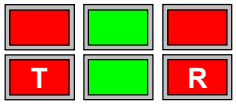
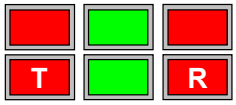
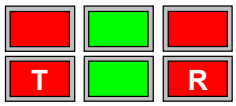
The filtration kit is connected to the air input on the rear panel of the instrument.

It consists of a dust filtering cartridge (5µm) and another cartridge (0.01 µm) giving residual oil pollution equal to 0.01 ppm.

Chapter 6
ERROR MESSAGES

The **ATEQ F420P** can display error messages if there are operational problems.

PROBLEM	LIT INDICATORS	MESSAGE DISPLAYED
Test error. Leak in excess of the full scale. **Action**: check the test circuit.		CYCLE/Pr001 PRESS=0.942 bar LEAK=>>F.S TEST READY (NO OK)
Pressure in excess of the full scale. **Action**: decrease the pressure using the mechanical regulator knob or the target if an electronic regulator is used.		CYCLE/Pr001 PRESS=> FULL SCALE READY (NO OK)
Pressure in excess of the max. threshold. **Action**: check regulator settings, pressure limits, check whether the right regulator has been selected if there are two.		CYCLE/Pr001 PRESS=1.02 bar P> READY (NO OK)
Pressure below the min. threshold. **Action**: check the network pressure and regulator settings, the pressure limits, and whether the right regulator has been selected if there are two.		CYCLE/Pr001 PRESS=0.000 bar P< READY (NO OK)
ATR error. **Action**: run another ATR learning cycle or check the ATR parameters. ATR fault.		CYCLE/Pr001 PRESS=0.942 bar LEAK=ATR ERROR READY (NO OK)
Fault: no CAL learning **Action**: carry out CAL learning		CYCLE/Pr001 PRESS=0.942 bar LEAK=CAL DEFAULT READY (NO OK)

PROBLEM	LIT INDICATORS	MESSAGE DISPLAYED
or CAL drift found following request for CAL check. **Action**: check the programmed percentage of CAL drift, the known standard leak and the test pressure.		CYCLE/Pr001 PRESS=0.942bar LEAK=CAL ERROR READY (NO OK)
Commutation fault in the equalising valve. **Action**: check network pressure, contact ATEQ after sales service for repair.		CYCLE/Pr001 PRESS=0.942 bar LEAK=VALVE DEF. READY (NO OK)
1) The electronic regulator has been unable to initialise correctly. **2)** The input pressure on the regulator must be at least 10 % of regulator full scale + 100kPa (+ 1 bar). **Action**: check supply network pressure or pressure at the regulator input.	 	The indicator lights come on briefly after the following message is displayed : REGULATOR ERROR
PROG error: the I/O's have selected a program with no parameters. **Action**: enter program parameters.		CYCLE/Pr.:009 ERROR
Inappropriate size for the selected unit of pressure. **Action**: change unit or modify the minimum and maximum pressure limits if these and the test pressure can be used with this unit.		PARAM/Pr001 >Press. Unity: mbar MAX Fill : PPPP MIN Fill : 0.0

Chapter 7
OPERATIONAL PROBLEMS

1. PHENOMENON NOTED

If a test machine begins to detect too many bad parts (statistically, more than three consecutively), it is advisable to carry out a **check on the whole unit.** The quality of the manufacture and operation of the leak detector should be the last things considered.

1.1. CONDITION OF THE MACHINE'S SEALS

This is the no.1 defect as the seals are subject to high levels of dirt contamination (alumina, shavings). Regular cleaning of the seals is an effective remedy.

1.2. DAMAGED INSTRUMENT SEALS

There is a possibility that the seals may be cut by shavings or worn by repetitive squashing. This can be prevented by regular servicing and replacement of the seals.

1.3. BUMPER PAD

This is a defect which may occur after a certain amount of time as the bumper pads may be worn, or if the pressure settings in the air cylinder are inadvertently disturbed. Check the stability of the measurement and that the bumper pads are correctly installed.

1.4. PNEUMATIC AIR SUPPLY TOO LOW

This anomaly can cause false measurements (large leaks or erratic measurements). The air supply to the cells must be higher than the minimum of 4 bar and it is essential that it is greater than the minimum test pressure of 1 bar. Also check that sealing connectors are being used correctly.

1.5. PNEUMATIC LINK

The link and reference pipes will age and break with time. The pipes and seals must conform to the required quality. **ATEQ** recommends the use of RILSAN PA11 pipes and AVS type joints.

1.6. ENVIRONMENT

A measurement may be affected by a variation in background temperature (sun, draughts, storage of parts outdoors, handling of the test part by the operator, ...).

The dampness of parts may cause errors in the readings (insufficient drying after washing, outdoor storage, condensation, presence of water in the fixture, ...).

1.7. CALIBRATION

ATEQ does not accept any liability in regard to calibrations and settings to its instruments which are not carried out by its own personnel.

1.8. CONCERNS ABOUT RELIABILITY OF THE INSTRUMENT'S CIRCUITS

If all the other checks do not resolve the problem, the instrument's circuit may be checked.

Proceed as follows:

- ✓ Segregate the instrument from its environment (pneumatic assembly),
- ✓ Connect up the instrument (test output),
- ✓ Choose an unused program,
- ✓ Set the parameters as follows:
  - ⇒ the regulator to the test pressure,
  - ⇒ the pressure monitoring thresholds to +/- 20 % of the test pressure,
  - ⇒ wait times A and B 0 seconds,
  - ⇒ fill time 4 seconds,
  - ⇒ stabilisation time 10 seconds,
  - ⇒ test time 10 seconds,
  - ⇒ dump time 1 second,
  - ⇒ reject level maximum,
  - ⇒ unit Pa/sec,
  - ⇒ function all functions cancelled.

Run two consecutive cycles.

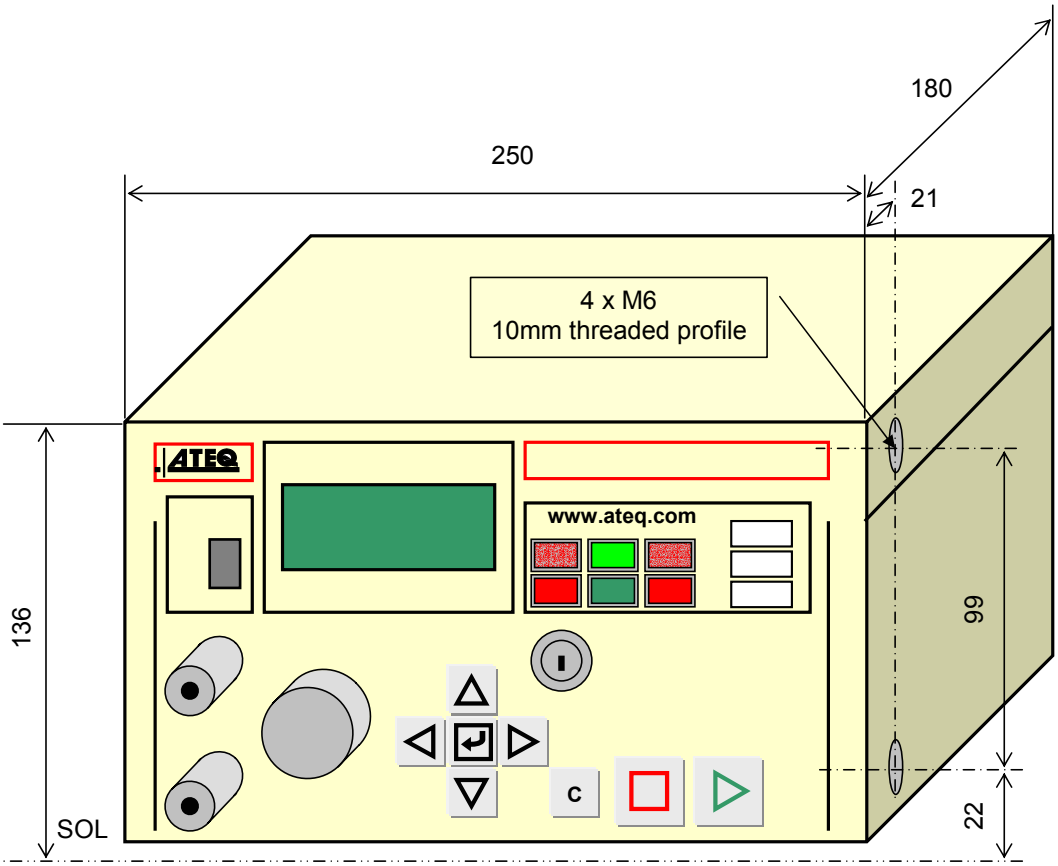
The post test time result should not exceed 4 Pa/sec.

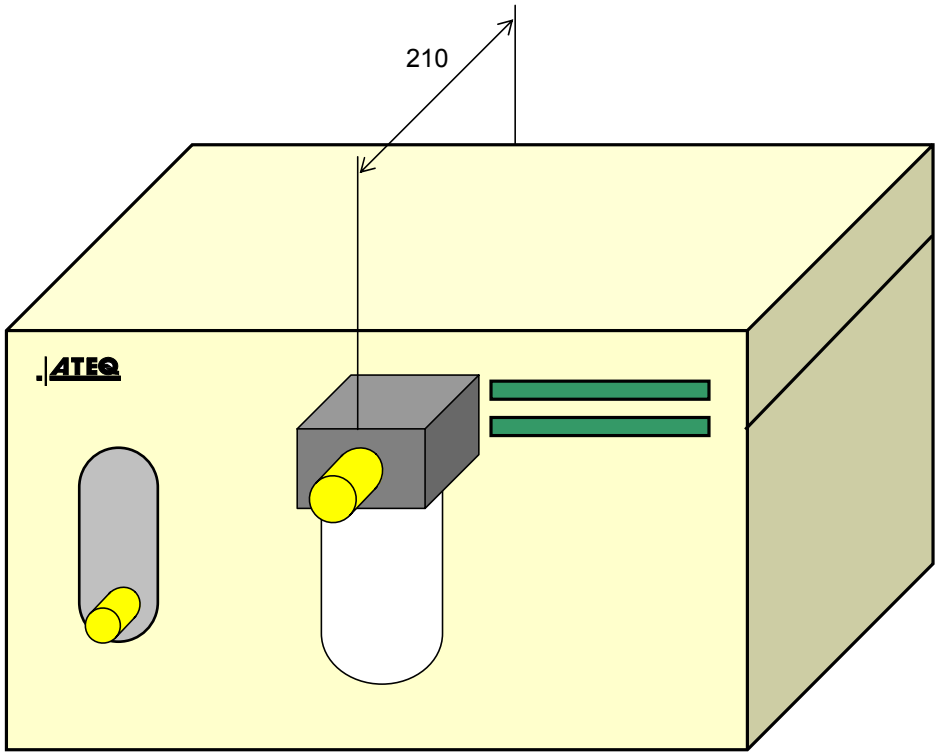
Appendices
ATEQ F420P

1. TECHNICAL CHARACTERISTICS OF THE F420P

	F420P
Dimensions H x L x D (mm) :	136 x 250 x 180
Dimensions with air filter and regulator (mm) **:**	136 x 250 x 270
Power supply :	24 VDC / 1,6 A Min 23,5 V ; Max 28 V
Pneumatic connections :	3/5, 4/6 ou 6/8
Weight (kg) **:**	About. 4
Format :	½ 19 inches
Temperatures :	
Operational :	+10°C to +45°C
Storage :	0°C to +60 °C

2. MECHANICAL DEFINITION DRAWINGS OF F420P





3. CONVERSION TABLE

TO

FROM	**Pa**	**kPa**	**bar**	**mbar**	**mmH2O**	**atm**	**Torr**	**psi**	**inH2O**	**inHg**
Pa	**1**	10^{-3}	10^{-5}	10^{-2}	0.10197	$9.8692\ 10^{-6}$	$7.5\ 10^{-3}$	$1.45\ 10^{-4}$	$4.01\ 10^{-3}$	$2.95\ 10^{-4}$
kPa	10^{3}	**1**	10^{-2}	10	101.97	$9.8692\ 10^{-3}$	7.5	0.145	4.01	0.295
bar	10^{5}	10^{2}	**1**	10^{3}	10197	0.98692	750	14.5	401.46	29.53
mbar	10^{2}	10^{-1}	10^{-3}	**1**	10.197	$9.8692\ 10^{-4}$	0.75	$1.45\ 10^{-2}$	0.401	$2.95\ 10^{-2}$
mmH2O	9.806	$9.8067\ 10^{-3}$	$9.8067\ 10^{-5}$	$9.8067\ 10^{-2}$	**1**	$9.6784\ 10^{-5}$	$7.3556\ 10^{-2}$	$1.4223\ 10^{3}$	$3..937\ 10^{-2}$	$2.895\ 10^{-3}$
atm	$1.013\ 10^{5}$	101.33	1.0133	1013.3	10332	**1**	760	14.695	406.78	29.921
Torr	133.32	0.13332	$1.3332\ 10^{-3}$	1.3332	13.595	$1.3158\ 10^{-3}$	**1**	$1.9337\ 10^{-2}$	0.535	$3.937\ 10^{-2}$
psi	6897.8	6.8948	$6.8948\ 10^{-2}$	68.948	703.07	$6.8045\ 10^{-2}$	51.71	**1**	27.68	2.036
inH2O	249,09	0.2491	$2.4909\ 10^{-3}$	2.4909	25.400	$2.4583\ 10^{-3}$	1.8683	$3.61\ 10^{-2}$	**1**	$7.35\ 10^{-2}$
inHg	3386.4	3.3864	$3.3864\ 10^{-2}$	33.864	345.32	$3.3421\ 10^{-2}$	25.4	0.491	13.595	**1**

4. PARAMETERS STORED

	PARAMETERS	Program n°	Program n°	Program n°	Program n°
TIME	Waiting				
	Fill				
	Stabilisation				
	Test				
	Dump				
	Pre-Fill				
	Pre-Dump				
REJECT	Test reject				
	Reference reject				
	Recov reject test.				
	Recov. refer. reject				
PRESS	Max. Pressure				
	Min. Pressure				
	Pre-Fill				
	Test Pressure				

5. VALVES CODES USED IN YOUR APPLICATION

PROGRAM GROUP :

PROGRAM	VALVE CODE	FUNCTION
01		
02		
03		
04		
05		
06		
07		
08		
09		
10		
11		
12		
13		
14		
15		
16		

6. USER NOTES

Index

A

Additional functions 38
Adjust regulator pressure 55
ATR cycle 40
ATR error 67
ATR fault 67
ATR learning 60
Auto-diagnostics check 59
Automatic connectors 40, 66

B

Blockage mode 23

C

C540 / F580 47
CAL check 59
Calibration leaks 64
Characteristics 6
Choose a cycle end 42
Create a new program 21
Cycle end 42
Cycle keys 18

D

Definition of the **ATEQ F420P** 5
Delete a program 30
Detailed display of the test results 62
Determine the fill time 25
Determine the stabilisation time 25
Direct measurement 7
Dump level 52
Dump time 26
Duplicate a program 28

E

Export the results to Microsoft Excel ..49
Extended menus 38

F

Filtration kit 66
Frame formats 48
Functions 27
Functions menu 36

I

I/O Configuration 53
Indirect measurement 7
Infinite fill 56
Infra-red interface 20

K

Key access position 19
Key locked position 19

L

Language 62
LCD 4 line display 20
Leak mode 22
Leak/Flow calibrator 65
Lighting the screen 51

M

Maximum fill 26
Measurement cycle 8
Minimum fill 26

N

Navigation keys 18
Needle valves 65
Negative leak indicator 20
Negative threshold 47

O

Operator mode 23

P

Parameter settings 24
Part bad indicator 20
Part OK indicator 20
Pneumatic connector 15
Power supply 63
Pressure inferior to min threshold. 67
Pressure over max threshold. 67
Pressure too high 67
Pressure units 26
Print frame 48
Print parameters 48
Print the results 47
Printer 15, 47
Printing the results 62
Program choice 31
Programmable input 13

R

Rapid connectors 19
Recoverable 20
Recoverable reject level 47
Recoverable thresholds 47
Regulator adjustment 32
Reject units 27
Reset the results memory 62
RS232 15

S

Sequence several test cycles 39
Special cycles 32
Stand by 62
Stop the measurement 32
Symbols 9

T

Test error 67
Test in calibrated Pa/s or Pa 58
Test reject 27
Test time 26
Test types 22

W

Wait times A and B 24
Warning 20
Work in calibrated Pa/s or Pa 58

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